VOL. XXXIII. PART 1 JANUARY, 1954
(*Issued February, 1954*)

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No. 7. Bibliography of systematic mycology, 1948. 34 pp., 1949. *Price* 2*s*.
No. 8. Bibliography of systematic mycology, 1949. 28 pp., 1950. *Price* 2*s*.
No. 9. Bibliography of systematic mycology, 1950–1951. 42 pp., 1952. *Price* 3*s*.
No. 10. Bibliography of systematic mycology, 1952. *Price* 3*s*.

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15 FEB 1954

List of Journals Regularly Examined for the Review of Applied Mycology

JANUARY 1954

Abstr. Publ. Pap. & List Transl.
Acta agron. Palmira
Acta microbiol. polonica
Acta Soc. Bot. Polon.
Adv. Leafl. Dep. Agric. Scot.
Agrátudomány
Agric. Anim. Husb, Uttar Pradesh
Agric. Chemic.
Agric. Engng, St. Joseph, Mich.
Agric. Gaz. N.S.W.
Agric. J. Fiji
Agric. Lit. Boron
Agricultor venezol.
Agricultura trop.
Агробиология [Agrobiology, Moscow]
Agron. J.
Agron. lusit.
Agron. trop., Maracay
Agron. trop., Nogent
Amer. Dyest. Reptr
Amer. J. Bot.
Amer. Midl. Nat.
Amer. Potato J.
Amtl. PflSchBestimm.
An. Congr. Soc. bot. Brasil
An. Inst. bot. A. J. Cavanilles (*formerly* An. Jard. bot. Madr.)
An. Jard. bot. Madr. (*now* An. Inst. bot. A. J. Cavanilles)
An Soc. cient. argent.
Ann. appl. Biol.
Ann. bot. Herb., Santa Catarina
Ann. Bot., Lond., N.S.
Ann. Éc. Agric. Montpellier
Ann. Gembl.
Ann. Inst. phytopath. Benaki
Ann. Inst. Rech. Agron. Sér. C (Ann. Épiphyt.)
Ann. Inst. sup. Agron., Lisboa
Ann. Mo. bot. Gdn
Ann. phytopath. Soc. Japan
Annu. Fac. Agron. Silvicult. Skoplje
Annu. Inst. Rech., agron. Skoplje
Annu. Rev. Microbiol.
Ann. Serv. bot. Tunis
Ann. Sper. agr., N.S.
Annu. Mus. Hist. nat.
Annu. Rep. Plant Prot. Inst. Izmir-Bornova
Arch. Biochem., N.Y.
Arch. fitotéc. Urug.
Arch. Inst. Bot.
Arch. Jard. bot. Rio de J.
Arch. Koffiecult. Ned.-Ind.
Arch. Mikrobiol.
Arch. Rubbercult. Ned.-Ind.
Arch. Theecult. Ned.-Ind.
Arkans. Fm Res.
Ark. Bot.
Arq. Inst. biol. (Def. agric. anim.), S. Paulo
Arq. Serv. flor. Brasil
Atti Ist. bot. Univ. Pavia
Aust. dried Fruits News
Aust. J. agric. Res.
Aust. J. biol. Sci. (*formerly* Aust. J. sci. Res., Ser. B)
Aust. J. Bot.
Aust. J. exp. Biol. med. Sci.
Aust. J. Sci.
Aust. J. sci. Res., Ser. B (*now* Aust. J. biol. Sci.)
Aust. Orchid Rev.

Bact. Rev.
Bergcultures
Ber. Ohara Inst.
Bibliogr. Agric. U.S. Dep. Agric.
Bibliogr. sci. Publ. S. Asia
Bi-m. Progr. Rep. Dep. Agric. Can.
Biochem. J.
Biol. Abstr.
Biológico
Biologica, Santiago
Biol. Rev.
Bol. Inf. S. Paulo
Bol. Inf. Colombia
Boll. Staz. Pat. veg. Roma
Bol. Pat. veg. Ent. agríc., Madr.
Bol. Prod. Fom. agríc., B. Aires
Bol. Sec. Agric. Pernambuco
Bol. Soc. broteriana
Bol. Suptda Serv. Café, S. Paulo
Bot. Bull. Acad. sinica
Bot. Gaz.
Bothalia
Bot. Mag., Tokyo
Bot. Notiser
Bot. Rev.
Bragantia
Brit. Fm Mech.
Brit. J. exp. Path.
Broteria
Bul. Grăd. bot. Cluj
Bull. Acad. polon. Sci.
Bull. agric. Congo belge
Bull. anal. Cent. nat. Tech. sci.
Bull. Ariz. agric. Exp. Sta.
Bull. Ark. agric. Exp. Sta.
Bull. Aust. Commonw. Coun.
Bull. Calif. agric. Exp. Sta.
Bull. Calif. Dep. Agric.
Bull. Cent. Rech. agron., Bambey
Bull. Coll. For., Beograd
Bull. Conn. agric. Exp. Sta.
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Bull. Dep. Agric. S. Afr.
Bull. Dep. Agric. Trin. Tob.
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Bull. Fac. Agric. Yamaguti Univ.
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Bull. For. Br. Can.
Bull. For. Exp. Sta., Meguro
Bull. Ga Exp. Sta.
Bull. Ia agric. Exp. Sta.
Bull. Ill. agric. Exp. Sta.
Bull. Inst. agron. Gembloux
Bull. int. Acad. Cracovie (Acad. pol. Sci.), Sér. B
Bull. Jard. bot. Brux.
Bull. Ky agric. Exp. Sta.
Bull. Mass. agric. Exp. Sta.
Bull. Me agric. Exp. Sta.
Bull. mens. Soc. linn. Lyon
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Bull. Mus. Hist. nat., Paris
Bull. nat. Inst. agric. Sci. Tokyo
Bull. nat. Sci. Mus. Tokyo
Bull. N.Y. St. agric. Exp. Sta.
Bull. N.Y. St. Fl. Grs
Bull. Okla. agric. Exp. Sta.
Bull. Pa agric. Exp. Sta.
Bull. Pacif. Orchid Soc. Hawaii
Bull. R.I. agric. Exp. Sta.
Bull. Soc. Bot. Belg.
Bull. Soc. bot. Fr.
Bull. Soc. for. Belg.
Bull. Soc. Hist. nat. Afr. N.
Bull. Soc. Hist. nat. Toulouse
Bull. Soc. mycol. Fr.
Bull. Tea Res. Inst. Ceylon
Bull. Tex. agric. Exp. Sta.
Bull. Torrey bot. Cl.
Bull. Wash. St. Dep. Agric.
Bull. Wis. agric. Exp. Sta.
Bull. Wyo. agric. Exp. Sta.
Bull. W. Va agric. Exp. Sta.

Cacao Inform. Bull.
Cacao (Int.-Amer. Cacao Cent.)
Calif. Agric.
Calif. Citrogr.
Canad. J. agric. Sci. (*formerly* Sci. Agric.)
Canad. J. Bot.
Canad. J. Tech.
Cane Gr. quart. Bull.
Castanea
Cereal Chem.
Ceylon J. Sci.
Chem. Abstr.

Chem. & Ind. (Rev.)
Chron. Nat.
Cienc. e Invest.
Circ. Fla agric. Exp. Sta.
Circ. Okla agric. Exp. Sta.
Circ. Rubb. Res. Inst. Ceylon
Circ. Rubb. Res. Inst. Malaya
Colon. Pl. Anim. Prod.
Comm. Gr. (*formerly*) Fruit Gr.
Conf. U.P.A. S. India
Contr. Boyce Thompson Inst.
Countryman, Nicosia
Courr. Cherch. Off. Rech. Sci. Outre-Mer
C.P.S. News
C.R. Acad. Agric. Fr.
C.R. Acad. Sci., Paris
Crops & Soils
Curr. Sci.

Darwiniana, B. Aires
Diss. Abstr.
Down to Earth

E. Afr. agric. J.
Ecol. Rev.
Econ. Proc. R. Dublin Soc.
Emp. Cott. Gr. Rev.
Emp. J. exp. Agric.
Endeavour
Ent. Phytopath. appl. Tehran
Euphytica
Experientia
Ext. Bull. Cornell agric. Exp. Sta.

F.A.O. Developm. Pap. (Dig. Plant Quarant. Regul.)
F.A.O. Mon. Document. List
F.A.O. Pl. Prot. Bull.
Farlowia
Farmer, Kingston, Jam.
Flygbl. Skogsforskningsinst.
Flygbl. Växtskyddsanst.
Fmg in S. Afr.
Fm Home Res.
Fmrs' Bull. U.S. Dep. Agric.
Folia biol. Cracow
Food
Food & Agric., Rome
Food Invest.
Food Pack.
Food Res.
Food Sci. Abstr.
Forage Crops Leafl. Okla agric. Exp. Sta.
For. Abstr.
For. Chron.
Foreign Agric.
Лес. Хоз. [Forest Husbandry]
Forestry
Friesia
Fruits d'outre-mer
Fruit Gr. (*now* Comm. Gr.)
Fruits Prim. Afr. N.
Fungus, Wageningen

Gaz. Agric. Moçamb.
Gdnrs' Chron., Ser. 3
Gdns' Bull.
Greenkeep. Reptr

Hassadeh
Hawaii. Plant. Rev.
Hedwigia
Herb. Abstr.
Hereditas, Lund.
Hilgardia
Hoja inform. Argentina
Hoosier Hort.
Hort. Abstr.

Idia
Indian Coffee
Indian For.
Indian For. Rec., N.S. Myc.
Indian J. agric. Sci.
Indian Phytopath.
Industr. Engng Chem.
Inf. Estac. agríc. 'La Molina'
Int. Bull. Bact. Nomencl. Tax.
Invest. tec. Agríc. Guatemala
Iowa Fm Sci.
Iowa St. Coll. J. Sci.
Irish Nat. J.

J. agric. Sci.
J. agric. Soc. Trin. Tob.
J. Agric. Univ. P.R.
J. Amer. chem. Soc.
J. Amer. Leath. Chem. Ass.
Jap. J. Bot.
Jardins de France
J. Arnold Arbor.
J. Aust. Inst. agric. Sci.
J. Bact.
J. Bd Greenkeep. Res. (*now* J. Sports Turf Res. Inst.)
Jber. biol. Bundesanst. Land u. Forstw., Braunschw.
J. biol. Chem.
Бот. Журн. [J. Bot. U.S.S.R. = Bot. Zh.S.S.S.R.]
J. Dairy Sci.
J. Dep. Agric. Eire
J. Dep. Agric. S. Aust.
J. Dep. Agric. Vict.
J. Dep. Agric. W. Aust.
J. Ecol.
J. econ. Ent.
J. Elisha Mitchell sci. Soc.
J. exp. Bot.
J. Fac. Sci. Hokkaido Univ.
J. For.
J. Genet.
J. gen. Microbiol.
J. hort. Sci.
J. Indian bot. Soc.
J. Indian Inst. Sci.
J. Inst. Brew.
J. Jap. Bot.
J. Linn. Soc. (Bot.)
J. Madras Univ.
J. Minist. Agric.
J. nat. Inst. agric. Bot.
J. R. agric. Soc.
J. R. hort. Soc.
J. Rubb. Res. Inst., Malaya
J. S. Afr. Bot.
J. sci. agric. Res., Beograd
J. Sports Turf Res. Inst. (*formerly* J Bd. Greenkeep. Res.)
J. Text. Inst.
J. W. Afr. Inst. Oil Palm Res.
J. Wash. Acad. Sci.

Karstenia
Kew Bull.

Landbouw, Buitenz.
Landbouwk. Tijdschr., Wageningen
Leafl. For. Comm., Lond.
Leeuwenhoek ned. Tijdschr.
Lighter (Dep. Agric., Can.)
Lilloa
Lincs. agric. J.
Lloydia

Maanedsovers. Plantesygd.
Malay. agric. J.
Malay. Forester
M.G.A. Bull.
Medd. Forsøksv. Plantek. Khb.
Medd. norske Skogforsøksv.
Medd. Skogsförsöksanst., Stockh. (*now* Medd. SkogsforsknInst., Stockh.)
Medd. SkogsforsknInst., Stockh. (*formerly* Medd. Skogsförsöksanst., Stockh.)
Medd. Växtskyddsanst. Stockh.
Medd. VetHøjsk. plantepat. Afd., Kbh.
Medd. Vestland. forstl. Forsøkssta.
Meded. alg. Proefst. Avros
Meded. Inst. PlZiekt. Wageningen
Meded. phytopath. Lab. Scholten
Mem. Camb. Sch. Agric.
Mem. Fac. Agric. Hokkaido Univ.
Mem. Fac. Agric. Kagoshima Univ.
Mem. Fac. Sci. Kyusu Univ.
Mem. Inst. polon. Écon. rur.
Mem. Ist. Pat. veg., Pisa
Mem. Soc. broteriana
Mem. Technol. exp. Moliner. Panific.
Memor. Tocklai exp. Sta.
Merkbl. Zent.-Inst. Forstw., Hamb.
Микробиология [Microbiology, Moscow]
Misc. Pap. Dep. Agric. Can.
Misc. Publ. Brit. agric. Off.
Misc. Publ. Dep. Agric. Kenya
Misc. Publ. Egypt. Univ.
Misc. Publ. F.A.O.
Misc. Publ. Iowa Exp. Sta.
Misc. Publ. Ohio agric. Exp. Sta.
Misc. Publ. Okla agric. Exp. Sta.
Misc. Publ. Utah agric. Exp. Sta.
Misc. Publ. Wis. For. Prod. Lab.
Misc. Rep. Wis. agric. Exp. Sta.
Mitt. biol. ZentAnst. Berl.
Mitt. Reichsinst. Forst-u. Holzw.
Mitt. schweiz. Landw.
Mon. agric. Rep., Lond.
Mushroom News
Mycol. J. Nagaoa Inst., see Nagaoa
Mycologia
Mycol. Pap. Commonw. Mycol. Inst.
Mycopathologia

N.A.A.S. quart. Rev.
NachrBl. dtsch. PflSchDienst, Berl.
NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart
Nagaoa
Nagpur agric. Coll. Mag.
Nat. agric. chem. Ass. News
Naturalist, Lond.
Nature, Lond.
Природа [Nature = Priroda, Moscow]
Netherlands J. agric. Sci.
New Commonw.
New Phytol.
News nat. Res. Coun. Can.
Norsk Landbr.
Notas agron. Estac. agríc. exp. Palmira
Notiz. Malatt. Piante, N.S.
Бот. Матер. [Not. syst. Sect. crypt. Inst. bot. Acad. Sci. U.S.S.R.]
Nuovo G. bot. ital.
N.Z.J. Agric.
Nyasald agric. quart. J.
N.Z.J. Sci. Tech., Sect. A

Ochr. Rost. [Plant Prot., Prague]
Ohio J. Sci.
Orchid J.

Pacif. Orchid Soc. Hawaii
Pacif. Sci.
Paint, Col. Oil Manuf.
Palest. J. Bot., Jerusalem
Palest. J. Bot., Rehovot
Pap. Mich. Acad. Sci.
Parasitica
Parasitology
Park Admin., S. Africa
Pedology, Leningr.
Pflanzenarzt
Pflanzenschutz
PflSchBer.
PflSchBestimm.
Pharm. J.
Philipp. Agric.
Philipp. J. Sci.
Phytopathology
Phytopath. Z.
Planta
Plant Breed. Abstr.
Plant. Bull. Rubb. Res. Inst. Malaya
Plant. Chron.
Plant Dis. Reptr
Plant Dis. Reptr, Suppl.
Plant Dis. Surv. N.S.W. Dep. Agric.
Plant Path.
Plant Physiol.
Plant Prot. Bull., Ankara
Plant Prot. Bull., New Delhi
Plant Prot. Overseas Rev.
Pl. Prot. J., Ankara
Portug. Acta biol.
Preslia (*formerly* Studia bot. čechosl.)
Proc. Amer. Soc. hort. Sci.
Proc. Amer. Soc. Sug. Beet Tech.
Proc. Amer. Wood Pres. Ass.
Proc. Crop Sci. Soc. Japan
Proc. Indian Acad. Sci., Sect. B
Proc. Indian Nat. Inst. Sci.
Proc. Ind. Acad. Sci.
Proc. Iowa Acad. Sci.
Proc. Linn. Soc. Lond.
Proc. Linn. Soc. N.S.W.
Proc. nat. Acad. Sci. Wash.
Proc. Okla Acad. Sci.
Proc. roy. Soc., Ser. B
Proc. roy. Soc. Qd
Proc. roy. Soc. Vict.
Proc. Canad. phytopath. Soc.
Proc. Qd Soc. Sug. Cane Technol.
Proc. Utah Acad. Sci.
Proc. W. Va Acad. Sci.
Progr. agric. vitic.
Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp.
Publ. Inst. belge Amélior. Better.
Publ. Inst. nat. agron. Congo belge
Pulp Pap. (Mag.) Can.
Pure Cult. Study Bact.

Qd agric. J.
Qd J. agric. Sci.
Quart. Bull. Mich. agric. Exp. Sta.
Quart. Circ. Ceylon Rubb. Res. Sch.
Quart. J. For.
Quart. Progr. Rep. trop. Test. Establ., Nigeria
Quart. Progr. Rep. W. Afr. Inst. Oil Palm Res.
Quart. Rev. Biol.
Quart. Rep. W. Afr. Cacao Res. Inst.

Rapp. Inst. Rech. agron., Paris
Rec. Dep. Agric. Uganda
Rec. Inst. Ecol. Biogeogr.
Rec. Res. Fac. Agric. Univ. Tokyo
Rech. agron. Madagascar
Rep. agric. Dep. Dominica
Rep. agric. Dep. Gold Cst
Rep. agric. Dep. Nigeria
Rep. agric. hort. Res. Sta. Bristol
Rep. B.C. Dep. Agric.
Rep. Bd Agric. Bermuda
Rep. bot. Gdns Dep. Singapore
Rep. Brit. Coun.
Rep. Bur. Sug. Exp. Stas Qd
Rep. B.W.I. Sug. Cane Breed. Sta.
Rep. Calif. Dep. Agric.
Rep. Canad. Pl. Dis. Surv.
Rep. Cawthron Inst.
Rep. colon. Developm. Corp.
Rep. Conn. agric. Exp. Sta.
Rep. Cornell agric. Exp. Sta.
Rep. Dep. Agric. Barbados
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Rep. Fd Invest. Bd, Lond.
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Rep. For. Dep. Trin. Tob.
Rep. For. Inst., Oxford
Rep. For. Prod. Res. Bd, Lond.
Rep. Ga agric. Exp. Sta.
Rep. Hawaiian Sug. Exp. Sta.
Rep. Idaho agric. Exp. Sta.
Rep. Indian Coffee Bd
Rep. Indian Coun. agric. Res.
Rep. Indian Jute Comm.
Rep. Insp. Agric. Malta
Rep. Ia agric. Exp. Sta.
Rep. Ky agric. Exp. Sta.
Докл. Акад. сельскохоз. Наук Ленина [Rep. Lenin Acad. agric. Sci. = Proc. Lenin Acad. agric. Sci.]
Rep. Inst. agric. Res. Tôhoku Univ.
Rep. Mass. agric. Exp. Sta.
Rep. Me agric. Exp. Sta.
Rep. Mich. agric. Exp. Sta.
Rep. minist. Agric. Can.
Rep. Minn. agric. Exp. Sta.
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Rep. nat. Inst. agric. Bot., Camb.
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Rep. Rubb. Res. Inst. Malaya
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Rep. Wye Coll.
Rep. W. Afr. Cacao Res. Inst.
Rep. Wyo. agric. Exp. Sta.
Res. in Rev.
Res. Stud. St. Coll. Wash.
Rev. agric. Maurice
Rev. agric. Nouv.-Calédonie
Rev. agric., Piracicaba
Rev. agric. Réunion, N.S.
Rev. agric. S. José
Rev. agron., Lisboa
Rev. appl. Ent., Ser. A
Rev. appl. Ent., Ser. B
Rev. argent. Agron.
Rev. Asoc. Ing. agron., Montevideo
Rev. Bot. appl.
Rev. Fac. Agron. B. Aires
Rev. Fac. Agron. Eva Peron (*formerly* La Plata)
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Rev. gén. Bot.
Rev. hort., Paris
Rev. industr. agríc. Tucumán
Rev. Inst. agríc. catal.
Rev. Mycol., Paris
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Rev. Path. vég.
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Rodriguésia
R.R.I. Plant. Bull., *see* Plant. Bull. Rubb. Res. Inst., Malaya

S. Afr. J. Sci.
S. Afr. Sug. J.
Schweiz. landw. Mh.
Schweiz. Z. Obst- u. Weinb.
Schweiz. Z. Pilzk.
Sci. Agric. (*now* Canad. J. agric. Sci.)
Sci. Bull. Dep. Agric. S. Afr.
Sci. & Cult.
Science
Sci. Proc. R. Dublin Soc., N.S.
Sci. Progr. twent. Cent.
Sci. Rep. agric. Res. Inst. N. Delhi
Sci. Rep. Fac. Agric. Okayama Univ.
Sci. Rep. Kagoshima Univ.
Sci. Rep. Yokohama Univ.
Scot. For.
Search
Seed World
Soybean Dig.
Советск. Агрон. [Soviet Agron., Moscow]
Sta. Bull. Ore agric. Exp. Sta.
Stain Tech.
Studia bot. čechosl. (*now* Preslia)
Sugar, N.Y.
Sug. Beet Bull.
Sug. Beet Rev.
Sug. Bull. Georgetown
Summ. Tab. biol. Tests
Svenska SkogsvFören. Tidskr.
Svensk bot. Tidskr.
Sverig. Utsädesfören. Tidskr.
Sydowia

Tabacco, Roma
Tasm. J. Agric.
Taxon
Tea Quart.
Tech. Abstr. Scand. & Holl.
Tidsskr. Planteavl
Tijdschr. PlZiekt.
Trans. bot. Soc. Edinb.
Trans. Brit. mycol. Soc.
Transl. Cont. Lists Russ. Period.
Trans. Norfolk Norw. Nat. Soc.
Trans. N.Y. Acad. Sci.
Trans. roy. Soc. N.Z.
Trop. Agriculture, Trin.
Trop. Agriculturist
Turrialba

Unasylva
Изв. Акад. Наук СССР [U.S.S.R. Acad. Sci. News = Bull. Acad. Sci. U.S.S.R.]

Valt. Maalatousk. Tiedon.
Växtskyddsnotiser, Stockh.
Versl. Dep. Landb. Suriname
Винод. и Виноград. [Vit. & Winemak.]

World Crops

Yearb. Agric. U.S. Dep. Agric.
Yearb. Fac. Agric. Belgrade
Yearb. Food agric. Statist., Tôhoku Univ.

Zašt. Bilja (Plant Prot., Beograd)
Z. Acker-u PflBau.
Z. Parasitenk.
Z. Pflanzenz.
Z. PflBau
Z. PflKrankh.
Z. Weltfw.
Zbl. Bakt., Abt. 2

Many other journals not regularly searched contain occasional papers which are noticed from originals or separates when traced.

COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW

OF

APPLIED MYCOLOGY

VOL. XXXIII JANUARY 1954

HENRY (B. W.). **A root rot of Southern Pine nursery seedlings and its control by soil fumigation.**—*Phytopathology*, 43, 2, pp. 81–88, 1 fig., 1953.

Most of the information in this paper on the control of root rot of southern pine (*Pinus palustris*, *P. caribaea*, and *P. echinata*) nursery seedlings in Mississippi has already been noticed from another source [*R.A.M.*, 31, p. 307]. Besides the fungi already mentioned [loc. cit.] as being associated with nematodes in the etiology of the disease, *Penicillium* spp., *Cephalosporium* sp., an unidentified fungus, and a bacterium, all apparently non-pathogenic, have often, but not consistently, been isolated from infected roots. The application of 24 gals. per acre of a 20 per cent. (by volume) solution of ethylene dibromide two to three weeks before sowing gave excellent control without injury at a cost of less than $50 per acre. The disinfectant was equally effective when applied to soil in good tilth and to wet soil, but fumigation in the autumn was less effective than in the spring. A tractor-mounted apparatus was capable of treating a nursery bed 415 by 6 ft. in approximately one minute, and seed-bed fumigation is now a regular practice at the Ashe Forest Nursery.

HEPTING (G. H.), ROTH (E. R.), & LUXFORD (R. F.). **The significance of the discolorations in Yellow-Poplar veneers.**—*Rep. U.S. Dep. Agric., Div. For. Path. N.C.* 1375 (Revised), 8 pp., 1 fig., 1 graph, 1952. [Mimeographed.]

Living wood of yellow poplar (*Liriodendron tulipifera*) is very variable in colour. Of the various discolorations described the only ones due to a fungus were sap stain and brown rot. The former, a pink to grey stain found extending 1 ft. or more inside cut logs, was due to *Endoconidiophora* [*Ceratocystis*] *coerulescens* [cf. *R.A.M.*, 29, p. 509] in 80 per cent. of isolations. In tests at the Forests Products Laboratory, North Carolina, it did not appear to reduce the toughness of the wood, which should be dried at a sufficiently high temperature to kill the fungus. Several different fungi have been isolated from brown stains, all of which weaken the wood.

BAVENDAMM (W.). **Pflanzliche Holzschädlinge. Merulius lacrymans (Wulf.) Schum. ex Fries. Coniophora cerebella (Pers.) Duby. Poria vaporaria (Pers.) Fr. Lenzites abietina (Bull.) Fr.** [Plant wood-destroyers. *Merulius lacrymans* (Wulf.) Schum. ex Fries. *Coniophora cerebella* (Pers.) Duby. *Poria vaporaria* (Pers.) Fr. *Lenzites abietina* (Bull.) Fr.]—*Holz a. Roh- u. Werkst.*, 9, pp. 251–252, 4 figs.; pp. 447–448, 4 figs., 1951; 10, pp. 39–40, 4 figs.; pp. 261–262, 4 figs., 1952. [Received 1953.]

Up-to-date information on the four destructive lignicolous fungi mentioned in the title is presented from the Federal Institute of Forestry, Reinbek, Germany, on the lines already indicated [*R.A.M.*, 32, p. 351].

ZOBERST (W.). **Die physiologischen Bedingungen der Pigmentbildung von Merulius domesticus Falck.** [The physiological requirements for pigment production by *Merulius domesticus* Falck.]—*Arch. Mikrobiol.*, 18, 1, pp. 1–31, 1952.

The results of comprehensive studies at the Technical Institute, Karlsruhe, Germany, on the factors governing pigmentation in *Merulius lacrymans* justify the assumption that the yellow pigment occurring in both mycelia and nutrient solutions is a normal metabolic product of the fungus. The respiration of pigmented mycelia is greater by 100 to 150 per cent. than that of the hyaline. The yellow pigment can be withdrawn from the medium by extraction with ether or adsorption on talc powder. The properties of the pigment suggest that it may be a quinoid compound. Generally speaking, the degree of assimilability of amino acids (as shown by mycelial dry weights) is related to the chain length; cyclic amino acids were poor sources of nitrogen, and methionine and thiourea exerted a toxic effect. Amino acids proved to be very poor sources of carbon. The enzymatic activities of a polyphenoloxidase from the mycelium of *M. lacrymans* indicate a similarity to the tyrosinase from potatoes or *Psalliota campestris.*

PEARL (W. L.). **A method for the estimation of decay in Douglas Fir wood chips.**—*T.A.P.P.I.*, 36, 3, pp. 133–136, 1 graph, 1953.

A method is fully described for the estimation of the amount and type of decay by [unspecified] brown, white-pocket, and 'dote' [*R.A.M.*, 32, p. 51] rots in Douglas fir [*Pseudotsuga taxifolia*] chips. It is based on the colour of (1) the filtrate from a boiling ethanol extraction of a ground sample, or (2) the solution after boiling in water for a given period, and (3) the extract from (2) after treatment with a small quantity of caustic. By means of this procedure the relative amounts of the predominant types of decay can generally be determined within limits of 5 to 10 per cent. The time required for the performance of the test (including the drying of the samples) is 36 to 48 hours.

CARTWRIGHT (J. B.), EDWARDS (D. W.), & MCMULLEN (M. J.). **Sterilization of timber with methyl bromide.**—*Nature, Lond.*, 172, 4377, pp. 552–553, 1953.

At the Division of Wood Technology, New South Wales Forestry Commission, Sydney, Australia, the value of methyl bromide as a sterilizing agent for timber infected by staining and wood-destroying fungi was tested by the soil-block method. The blocks, Norway spruce (*Picea abies*), were inoculated with various test organisms. In all cases good growth occurred with no contamination. The blocks were then subjected to a vacuum in a desiccator and a measured volume of methyl bromide was introduced, various combinations of gas concentration and periods of fumigation being employed.

The most effective treatment was 12 lb. per 1,000 cu. ft. for 96 hours, no growth of any of the test fungi being secured in isolations on malt agar; 20 lb. for 24 hours was moderately effective. These results suggest that it is possible to use methyl bromide for the sterilization (as distinct from preservation) of timber infected with fungi, especially large stocks or where heat treatment may be undesirable or impracticable.

KLUCZYCKI (K.). **Studią nad wartością grzybobójczą niektórych produktów oraz praktyczna metodyka jej badania.** [Study on the evaluation of the fungicidal properties of certain products and a practical method of testing them.]—*Acta microbiol. polon.*, 1, 3, pp. 223–256, 7 figs., 1 diag., 1952. [Russian and English summaries.]

Bituminous asphalts and tar-paper used for house insulation in Poland are attacked by fungi [cf. *R.A.M.*, 32, p. 330]. Seven samples of asphalt insulators, four

samples of petroleum-asphalts, and one of bituminous tar-pitch were tested at the Polytechnic, Gliwice, by the wood block agar method, the sample being placed on the block, using the test fungi *Coniophora cerebella* [*C. puteana*: cf. 32, p. 655] and *Merulius lacrymans* [32, p. 652]. Bituminous tar was almost unattacked after ten months; petroleum asphalt was the least resistant, being completely overgrown, indicating that fungi can decompose and utilize the bituminous substance. The addition of dinitrophenols or other volatile and solid toxins rendered the bituminous asphalts more toxic.

The toxic limit of DNC (mikrosol) was determined as 4·2 to 5·6 kg. per cu. m. wood for *C. puteana* and *M. lacrymans* and about 2·8 for *Poria vaporaria* [cf. 32, p. 655] (modified conventional method) and about 1·4 for *C. puteana* by the wood block method. Wood naturally infected with *M. lacrymans* and impregnated with mikrosol (80° [C.] for one hour) remained resistant for about six months. The chemical can be eluted with water.

The toxicity of certain compounds containing sulphonic acid was found to be rather low and dependent on the amount of the acid added, being increased by the admixture of nitro-derivatives. The toxic limits of α-sodium sulphonate and γ-calcium sulphonate for *C. puteana* were about 15 and 5 kg. per cu. m., respectively. That of preparation X_5 (obtained by adding nitrophenols to α-sulphonates), which is of high value as a wood preservative, was 0·8 to 1 kg. per cu. m., i.e. about 15 to 20 times more toxic than α-sulphonates. Absorption of this preparation was very good and wood treated with it acquired a beautiful mahogany colour.

It is suggested that the amount of decay should be evaluated not as the actual loss in weight of test blocks but as the relative loss (percentage of loss in the controls).

Lindgren (R. M.). **Permeability of Southern Pine as affected by mold and other fungus infection.**—11 pp., 2 figs., 1 graph, Washington, D.C., American Wood-Preservers' Association, 1952. [Received 1953.]

Information in this paper concerning the increase in permeability of southern pine wood due to infection by *Trichoderma viride* has already been noticed [*R.A.M.*, 32, p. 527]. Unsprayed posts subjected to natural infection by stain, mould (including *T. viride*), and [unspecified] decay fungi showed variable absorptions, higher in more heavily mouldy wood. *Trichoderma*-infected wood can be treated with greater facility than bright wood, by non-pressure methods.

Tsukiji (R.). **Decay durability of blue-stained timber.**—*Wood Ind.*, 7, 3, pp. 16–18, 1952. [Abs. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 2 (*1951–52*), pp. 56–57, 1953.]

In 50 days after inoculation by *Ceratostomella* [*Ceratocystis*] *ips* test pieces of *Pinus densiflora* were stained blue [*R.A.M.*, 32, p. 654]. When tested for durability with four wood-rotting fungi, *Lenzites alba*, *Fomes pinicola*, *Polyporus volvatus*, and *Schizophyllum commune*, the strength of the pieces was the same as that of healthy timber. The filtrate from a culture solution of *C. ips* contains substances which weakly control the growth of the wood-rotting fungi.

Hunt (G. M.) & Garratt (G. A.). **Wood preservation. Second Edition.**—xi+417 pp., 106 figs., 4 graphs, New York & London, McGraw Hill Book Company, Inc., 1953. $7.50.

The book is divided into the same twelve chapters as the first edition [cf. *R.A.M.*, 17, p. 641], with the incorporation of information on and illustrations of modern developments in wood preservation techniques since 1938.

ANDRUS (C. F.). **Evaluation and use of disease resistance by vegetable breeders.**—*Proc. Amer. Soc. hort. Sci.*, 61, pp. 434–446, 1953.

This paper has already been noticed from another source [*R.A.M.*, 32, p. 655].

YARWOOD (C. E.). **Pressure effects in fungus and virus infections.**—*Phytopathology*, 43, 2, pp. 70–72, 2 figs., 2 graphs, 1953.

At the University of California, Berkeley, pressure on leaves at 10 to 240 lb. per sq. in. killed fresh infections of bean [*Phaseolus vulgaris*] rust (*Uromyces phaseoli*) [*U. appendiculatus*], snapdragon [*Antirrhinum majus*] rust (*Puccinia antirrhini*), sunflower rust (*P. helianthi*), bean powdery mildew (*Erysiphe polygoni*), and spinach downy mildew (*Peronospora effusa*). The stronger the pressure and the younger the leaf, the more successful was the treatment and the greater the injury to the foliage. Pressure on bean leaves just before or after inoculation greatly increased the incidence of infection by the tobacco mosaic [*R.A.M.*, 31, p. 316], tobacco ring spot, and tobacco necrosis viruses. Pressure on Pinto bean leaves which had acquired resistance to *Colletotrichum lindemuthianum* with age induced a return of susceptibility.

SUGIYAMA (T.) & IWATA (M.). **Hunger signs in several vegetable crops.**—*J. hort. Ass. Japan*, 19, pp. 113–124, 1950. [Abs. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1 (*1950–51*), p. 5, 1952.]

Symptoms of major mineral deficiencies observed in pot experiments are described briefly for turnip, spinach, carrot, cabbage, and potato.

SUGIYAMA (T.), IWATA (M.), & SCHICHIJO (T.). **Hunger signs in vegetable crops. II.**—*J. hort. Ass. Japan*, 20, 2, pp. 89–97, 1951. [Abs. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1 (*1950–51*), p. 6, 1952.]

Descriptions are given of deficiency symptoms of the essential elements [see preceding abstract] observed in water and sand culture experiments with tomatoes, radishes, cabbages, and onions.

MCCLEAN (A. P. D.) & COWIN (S. M.). **Diseases of crucifers and other plants caused by Cabbage black ring-spot virus.**—*Sci. Bull. Dep. Agric. S. Afr.*, 332, 30 pp., 16 figs., 1952–3.

The results of a comprehensive study on a virus disease of cabbage and cauliflower in South Africa caused by cabbage black ring spot virus [*R.A.M.*, 32, p. 113] are presented. The disease was mild in cabbage, cauliflower, and endive, commencing as small, chlorotic spots which changed to necrotic rings with a green centre. Stocks (*Matthiola incana*) were attacked moderately severely, suffering growth retardation with bushy development, and diffuse leaf mottle and crinkle. Iceland poppy (*Papaver nudicaule*), Shirley poppy (*P. rhoeas*), and *Anchusa capensis* were attacked severely, showing diffuse leaf mottle, crinkle, chlorosis, and finally necrosis. In opium poppy (*P. somniferum*) the disease produced rapid, lethal, systemic necrosis.

The virus was readily transmitted by sap and by *Brevicoryne brassicae* and *Myzus persicae*. The fact that aphids starved first and then fed on an infected plant for 2 to 5 minutes transmitted the virus more efficiently than those fed continuously for several days indicates that it is of the non-persistent type.

In its physical properties, symptoms, and host range the virus is closely related to the turnip virus 1 group [turnip mosaic virus], and answers to the description of cabbage black ring spot or cabbage black ring [31, pp. 170, 474].

Two isolates from Iceland poppy and one each from cabbage and *Anchusa*

capensis remained infective in expressed sap at 20° to 25° C. for little more than 24 or 48 hours and were inactivated by ten minutes' exposure to a temperature of 60°. In expressed sap from diseased *Petunia* spp. they tolerated dilutions of approximately 1 in 1,000. When transmitted experimentally to healthy seedlings of the natural host the various isolates reproduced symptoms similar to those occurring in nature. In addition one or more was transmitted to wallflower, radish, *Zinnia*, spinach, *Amaranthus tricolor* and *A. caudatus*, and seven species of Solanaceae. Tobacco, *Nicotiana sylvestris*, *A. tricolor*, and *A. caudatus* developed only necrotic lesions; the remainder responded with either local and systemic symptoms or systemic only. There were two variants of *Datura stramonium*, one resistant to the virus and the other susceptible. Of the isolates transmitted to the susceptible variety, Iceland poppy No. 1 produced a mild disease often followed by recovery, whereas the others, including Iceland poppy No. 2, produced a more severe disease from which there was no recovery. Shoots from recovered plants grafted on to healthy stocks of susceptible *D. stramonium* were susceptible to re-infection by both the mild and the severe isolates. The mild isolate was unable to protect against the more severe disease produced by Iceland poppy No. 2.

Rohde (G[erda]). **Kohlhernie und Bor.** [Cabbage club root and boron.]—*Dtsch. Landw.*, 3, 12, pp. 642–646, 7 figs., 1952.

From a survey of the literature (bibliography of 50 titles) and the results of experiments at Blankenfelde, Germany, it is concluded that the true cause of club root in crucifers is boron deficiency, the role of *Plasmodiophora brassicae* [*R.A.M.*, 31, p. 158] being secondary. Thus, in 1951, only six out of 45 kohlrabi plants (13·3 per cent.) grown in heavily infested compost soil amended with borax at the rate of 20 kg. per ha. contracted the disease, compared with 19 out of 43 (44·2 per cent.) in untreated infested soil. In 1952 a similar test was carried out in a contaminated irrigation field, in which only 10 out of 149 kohlrabi plants (6·7 per cent.) in the section treated with borax developed club root, as against 71 out of 142 (50 per cent.) in the unamended.

Asuyama (H.) & Kasai (T.). **A mosaic disease of Komatsuna (Brassica rapa L. var. komatsuna).**—*Contr. Plant Viruses and Virus Dis.*, *1950*, pp. 37–50, 1950. [Abs. in *Rec. Res. Fac. Agric. Univ. Tokyo*, 1 (*1950–51*), pp. 8–9, 1952.]

The symptoms of mosaic on komatsuna turnip are vein-clearing of the leaves in the early stages of infection followed by chlorotic vein-banding, mottling with raised islands, malformation, and stunting of the plant. Greenhouse experiments showed that the virus was transmitted by aphids (*Myzus persicae* and *Rhopalosiphum pseudobrassicae*) and by carborundum inoculation. The incubation period ranged from 8 to 15 days. The host range of the virus included 15 species of plants, representing seven genera in five families, including yellow mustard (*Brassica cernus*). The virus is inactivated by heating for 10 minutes at 65° C., by dilution up to 1 in 14,000, and by treatment with absolute ethanol for two hours. It is considered to be identical with or very closely related to the Japanese radish stunt virus [*R.A.M.*, 30, p. 354].

Spencer (D. M.). **Watercress investigations.**—*Rep. nat. Veg. Res. Sta. Warwick*, *1950*, pp. 52–56, 1951; *1951*, pp. 61–68, 1952.

Some of this information on crook root disease of watercress [*Spongospora* sp.] has already been noticed [*R.A.M.*, 32, p. 657]. Zoosporangia germinated within three days of incubating infected root tissues at 19° to 25° C. and pH 5·5 to 8. Germination of spore balls was not observed. Primary roots containing zoosporangia were found throughout the year, except for a few weeks in late July and August. They

were first seen in secondary rootlets in April; spore balls were abundant from July to December. Inoculation was successful under either short or long periods of exposure to fluorescent lighting. Secondary rootlets, developed in the laboratory and inoculated with zoospores, produced plasmodia and zoosporangia after two weeks and spore balls after four. Again, spore balls did not germinate. Experiments in infected commercial beds to test the value of various fungicides and nutrients demonstrated that glauconite (hydrated potassium iron silicate) increased plant vigour; the other materials showed no promise.

McLean (D. M.). **Virus yellows of table Beets in the Pacific Northwest.**—*Plant Dis. Reptr*, 37, 5, pp. 276–279, 1 fig., 1953. [Multilithed.]

Most of this information on the occurrence, symptoms, and transmission of virus yellows of table beets in the Pacific Northwest has already been noticed from another source [*R.A.M.*, 32, p. 414]. DDT, BHC, parathion, malathion, metacide, and systox gave fair to good control of the aphid vector, *Myzus persicae*, in root beds isolated from the seed-producing area, but not in those near infected seed plants. So far, the only possible control of the disease lies in the isolation of stecklings from all susceptible biennial plants and the control of the aphid vectors.

Lackey (C. F.). **Attraction of Dodder and Beet leafhopper to vascular bundles in the Sugar Beet as affected by curly-top.**—*Amer. J. Bot.*, 40, 4, pp. 221–225, 8 figs., 1953.

Investigations at the Division of Sugar Plant Investigation, Riverside, California, revealed that the vascular bundles of sugar-beet leaves and petioles exert an external attraction for the leafhopper (*Circulifer tenellus*) [*Eutettix tenella*: *R.A.M.*, 16, p. 225] and for haustoria of dodder (*Cuscuta subinclusa* and *C. californica*) [29, p. 9]. In most cases both tend to penetrate the petiole immediately above the bundles rather than elsewhere. Degeneration of the phloem by beet curly top virus [32, p. 219] decreases the accuracy of both the leafhopper and dodder in reaching the bundles. Experiments, using curly top resistant beets [28, pp. 611, 613; 32, p. 354] in which the virus was present but did not cause degeneration of the phloem, demonstrated that the mere presence of the virus does not affect the accuracy of the leafhopper and dodder in penetrating the petioles. The pH gradient extended into the parenchyma only four or five cells from the phloem.

Keyworth (W. G.). **Silvering disease of Red Beet. A preliminary account.**—*Rep. nat. Veg. Res. Sta. Warwick, 1952*, pp. 12–13, 1953.

For several years a disease termed 'silvering' has been observed in Britain in seed crops of the red beet variety Cheltenham Green Top. In April or May, after the commencement of bolting, a few leaves on the main stem or on one of the laterals turn silvery-grey, the discoloration being either evenly diffused throughout the leaf or more intense along the veins. Finally all the leaves turn silvery and wilt and the plant dies. Sometimes the tap roots of severely wilted plants are rotted, especially near the crown. Occasionally plants in the steckling beds have been affected. During 1952 incidence was at a peak in June to July and declined subsequently. In many fields 40 to 75 per cent. of the plants were killed and in some the seed crop was reduced to under 2 cwt. per acre.

The disease was observed first in 1945 on at least two farms in Essex and one in Kent and has since been reported from many farms in both counties. There is no evidence of spread from farm to farm nor of any correlation with soil conditions. It is also apparently confined to seed crops. Further research is planned.

Lüdecke (H.). **Die Wirkung der Dynamal-Beize geprüft an 18 auf das gesamte Bundesgebiet verteilten Zuckerrübensortenversuchen im Vergleich zu Albertan-'trocken'.** [The effect of dynamal dip tested in 18 Sugar Beet variety experiments distributed over the entire Federal territory in comparison with albertan 'dry'.]—*Zucker*, 5, 24, pp. 545–548, 4 graphs, 1952.

In 1951 the copper- and mercury-containing dynamal seed dip [*R.A.M.*, 32, p. 277] was tested on 18 sugar-beet varieties in 18 localities in Germany to compare its effects on yield, sugar content, and incidence of *Cercospora* [*beticola*] with those of the pure mercurial albertan [32, p. 295]. The differences between the two preparations in respect of leaf spot control were not significant. Dynamal gave encouraging results in 1952, especially in stands raised from heavily contaminated seed.

Shemyakin (P. N.). Селекция на повышение устойчивости Сахарной Свеклы против возбудителей кагатной гнили. [Selection for increasing resistance of Sugar Beets to casual agents of storage rot.]—Сахар. Пром. [*Sug. Ind., Moscow*], *1953*, 4, pp. 39–42, 1953.

Experiments with *Botrytis cinerea* in investigations on the resistance of sugar beets to storage rots in the U.S.S.R. [cf. *R.A.M.*, 32, p. 357] indicated that the generally accepted idea of sugar beet having little resistance is unfounded. The widespread incidence of the disease is not due to the natural susceptibility of beets but rather to the loss of resistance through wilting or frost damage. Fresh, uninjured roots of different varieties from different parts of the country were all highly resistant and became infected only when stored in places where there was risk of injury. Tail ends of the root, unless killed by withering or frost, were not less resistant than other parts of the root when harvested.

In selecting for resistance, the necessity for reducing hollowness in the root is emphasized.

Wade (G. C.). **Why did many Greenfeast Pea crops fail on the North West Coast?** —*Tasm. J. Agric.*, 23, 2, pp. 153–156, 2 figs., 1952.

The results of spraying trials indicated that molybdenum deficiency was chiefly responsible for a widespread disorder in Greenfeast peas [*R.A.M.*, 24, p. 105; 32, p. 531] in the north-west coast area of Tasmania in 1950–1. Affected plants turned pale green to yellow, remained dwarfed with short internodes, and ceased to grow at an early stage of development. Nodule formation was very poor, the few present being brown and often completely decayed. Some of the leaves were narrow, with brownish dots of dead tissue, more numerous on the older leaves and concentrated along the margins, which often became necrotic. Molybdenum-sprayed plants developed fresh, green growth and abundant nodules, appearing quite healthy except for the oldest leaves. Some improvement in growth was observed on potassium-treated plants.

Canner's Perfection peas growing in molybdenum-deficient soil were also pale. The use of molybdenized superphosphate as a fertilizer for pea crops in this area is recommended.

Zaumeyer (W. J.) & Fisher (H. H.). **A new necrotic-lesion-producing strain of yellow Bean mosaic.**—*Phytopathology*, 43, 1, pp. 45–49, 1 fig., 1953.

A virus producing local necrotic lesions on bean (*Phaseolus* [*vulgaris*]) pods in eastern Washington in 1950 when compared with other viruses from the same host was found to be a new strain of bean yellow mosaic virus [*R.A.M.*, 32, p. 663]. It also induced more intense systemic mottling than the type strain on some varieties, e.g., Stringless Black Valentine, Full Measure, Pencil Pod Black Wax,

Puregold Wax, Idaho Refugee, Tendergreen, and Unrivalled Wax, but seldom caused top necrosis, a typical feature of the pod-distorting form (*Sta. Circ. Ore. agric. Exp. Sta.* 379, 6 pp., 1946) [*R.A.M.*, 29, p. 284] and the X strain from *Gladiolus* [26, p. 275].

The 44 bean varieties tested fell into three classes of susceptibility: (1) those developing both necrotic local infection and systemic mottle, comprising Black Creaseback, three types of Blue Lake, Great Northern U.I. No. 15, Ideal Market, Potomac, Red Mexican U.I. No. 3, Small White, White Half Runner, Kentucky Wonder, Michelite, and Robust (mild symptoms on the three last-named); (2) local lesions only, Great Northern U.I. Nos. 16, 31, and 123; and (3) systemic mottle only, Stringless Black Valentine, Bountiful, Dwarf Horticultural, Kentucky Wonder White, three types of Refugee, Topcrop, and a number of others. *P. lunatus*, *Vigna sesquipedalis*, and cowpea, which are resistant to other strains of bean yellow mosaic, proved susceptible to the necrotic strain, as also did tobacco and *Nicotiana rustica*, hitherto immune from yellow mosaic.

The physical properties of the new strain are comparable to those of the bean yellow mosaic type strain. Partial protection against infection by the former was conferred by previous inoculation with the bean mosaic, New York 15 [23, p. 207 and next abstract], and type yellow bean mosaic strains.

Frandsen (N. O.). **Untersuchungen zur Virusresistenzzüchtung bei Phaseolus vulgaris L. I. Phytopathologische Untersuchungen.** [Studies on breeding for virus resistance in *Phaseolus vulgaris* L. I. Phytopathological studies.]—*Z. PflZücht.*, 31, 3, pp. 381–420, 26 figs., 1952.

Following a tabulated survey of some viruses of bean (*Phaseolus vulgaris*) unknown in Germany, the author describes fully his studies at the Max Planck Plant Breeding Institute, Voldagsen, on bean mosaic and bean yellow mosaic [*R.A.M.*, 31, p. 587] which do occur in the country. Two new strains of bean mosaic, Voldagsen and Marienau, differ from both the common and the New York (Burkholder's) strains of the virus [see preceding abstract]. Both are characterized by pathogenicity to the Robust variety, harmlessness to Great Northern U.I. Nos. 15, 16, and 31, and the formation of circular, necrotic, primary lesions on Red Mexican U.I. No. 34 and Michelite, but Voldagsen also attacks Wachs Rheinland, which is resistant to Marienau. The results of premunity tests showed that the presence of Marienau may delay but not entirely prevent the expression of the symptoms caused by Voldagsen. *P. lunatus* var. *macrocarpus* was the only other legume susceptible to the Voldagsen strain among a number tested. This strain withstood dilution over a range from 1 in 1,500 to 1 in 2,000, a temperature of 56° to 58° C., and ageing *in vitro* at 20° for 36 to 48 hours and in air-dried leaves for more than 180. Systemic spread could not be detected until 48 hours at the earliest after inoculation. *Myzodes* [*Myzus*] *persicae* became infective after 20 to 50 minutes' feeding on mosaic-diseased plants. Bean mosaic virus was shown by inoculation experiments on the Robust variety to be present in the pollen of diseased plants [12, p. 414].

Bean yellow mosaic virus is considered to differ in several respects from the the various entities with which it has been identified and is accordingly designated *Marmor manifestum* n. nom. A Voldagsen isolate of the virus, differing from the typical and pod-distorting strains [see preceding abstract], induces generalized necrosis on Kentucky Wonder and yellow mosaic symptoms on Robust, Michelite, and Great Northern U.I. 15 and 23. It proved pathogenic in inoculation experiments on bean, *P. lunatus* var. *macrocarpus* (latent infection), broad bean (*Vicia faba* var. *minor*), which reacted by vein-clearing, yellow lupin (vein-clearing and stunting), white lupin and lentil (systemic necrosis), sweet pea, *Lathyrus tingitanus*, *Melilotus alba*, pea, soy-bean, and clover (*Trifolium hybridum* and *T. incarnatum*).

The dilution tolerance of the Voldagsen strain of bean yellow mosaic virus ranged from 1 in 1,000 to 1 in 1,500, the inactivation temperature being 56° to 58°, and it withstood ageing *in vitro* for 24 to 36 hours and in air-dried leaves for over 168. Systemic diffusion was not detectable until at least five days after inoculation. Infection was acquired by *Myzus persicae* after 20 to 50 minutes' feeding on diseased plants. The virus is not transmissible through bean seed but one case of its passage through that of *Melilotus alba* was clearly demonstrated [cf. 15, p. 274; 21, p. 115]. It was also present in the pollen of *M. alba* but not of bean.

In contrast to the results of Grogan and Walker [28, p. 105], the author's premunity tests with bean mosaic and bean yellow mosaic viruses yielded no evidence of cross-protection, i.e., the damage they inflicted together was greater than that caused by either alone. A strong complex action was observed in mixed infections. These findings do not support the hypothesis of a close relationship between the two viruses.

Bruinsma (F.) & Labruyère (R. E.). **Bestrijding van de vlekkenziekte in Zaadbonen (Colletotrichum lindemuthianum).** [Control of anthracnose in seed Beans (*Colletotrichum lindemuthianum*).]—*Meded. Dir. Tuinb.*, 16, 4, pp. 243–252, 4 figs., 1953. [English summary.]

Following an introductory note on the symptomatology, mode of dissemination, and overwintering of the bean [*Phaseolus vulgaris*] anthracnose fungus, *Colletotrichum lindemuthianum*, one of the most destructive pathogens of the crop in Holland [C.M.I. map No. 177], the authors report the results of control experiments at the Phytopathological Research Institute, Wageningen, from 1950 to 1952, inclusive. Four to six applications per season of dithane Z–78 (1 in 200) effectively combated the disease at a reasonable cost.

Pope (D. T.) & Munger (H. M.). **Heredity and nutrition in relation to magnesium deficiency chlorosis in Celery.**—*Proc. Amer. Soc. hort. Sci.*, 61, pp. 472–480, 1 fig., 1953.

Several celery varieties growing in organic soils in New York State developed a severe chlorosis, which was remedied by spraying affected plants with magnesium sulphate solution [*R.A.M.*, 32, p. 661]. When the susceptible variety Utah 10B and the resistant Summer Pascal were grown in culture solutions with different concentrations of magnesium, the latter variety produced higher fresh and dry weight than the former at all levels except in the full nutrient. Chemical analyses at Cornell University showed that varieties which expressed chlorosis contained significantly less magnesium than normal ones. Magnesium deficiency chlorosis occurred on soils combining a high calcium content and a neutral or slightly alkaline pH with relatively low magnesium and potassium contents.

In genetical experiments crossing a chlorotic variety with a normal one (S48–54–1 or Tall Fordhook) showed that a single dominant gene conditioned the utilization of magnesium.

Pope (D. T.) & Munger (H. M.). **The inheritance of susceptibility to boron deficiency in Celery.**—*Proc. Amer. Soc. hort. Sci.*, 61, pp. 481–486, 1 fig., 1953.

During work at Cornell University, New York, to determine whether heredity was involved in varietal responses to low levels of boron in celery grown in New York State, an inbred strain, S48–54–1, was compared with Summer Pascal at various concentrations of boron. At concentrations below 1 p.p.m. S48–54–1 produced significantly lower fresh and dry weight and exhibited the typical boron deficiency symptom of stem-cracking [cf. *R.A.M.*, 32, p. 533].

F_1, F_2, and back cross progenies resulting from crosses of normal parents with

S48–54–1, tested at a concentration of 0·01 p.p.m. boron, showed susceptibility to boron deficiency to be conditioned by a single recessive gene.

Swank (G.) & Perry (V. G.). **Control of disease in Celery seedbeds with methyl bromide.**—*Circ. Fla agric. Exp. Sta.* S–55, 8 pp., 4 figs., 1953.

Experiments at the Central Florida Experiment Station, Sanford, on the control of damping-off and red root (*Rhizoctonia* [*corticium*] *solani*, *Pythium* sp., and *Fusarium* sp.) of celery, have shown that methyl bromide [*R.A.M.*, 31, p. 269] is an effective soil fumigant. Good control has been obtained consistently in the Sanford area with an application of 1 lb. per 50 sq. ft. The fumigated area remains relatively free from soil-borne diseases and nematodes for approximately two months.

Harvey (H. L.). **Lettuce mosaic.**—*J. Dep. Agric. W. Aust.*, Ser. 3, 1, 5, pp. 667, 669, 1 fig., 1952.

Preliminary surveys of metropolitan market-gardens in Western Australia during July and August, [? 1952], showed that lettuce mosaic virus [*R.A.M.*, 32, p. 465] was present in amounts ranging from 1 to 90 per cent. If not checked it may become one of the most serious diseases of local winter lettuce crops. Control is recommended by the usual practices [cf. 29, p. 454; 32, p. 533].

Guide pour les traitements de la Vigne. [A guide to Vine treatments.]—*Rev. romande Agric.*, 8, 12, pp. 97–99, 1952.

A list is given of commercial fungicides, insecticides, and wetters authorized for use in Switzerland against vine diseases and pests [cf. *R.A.M.*, 32, p. 8], followed by a table giving the period of application for each treatment, disease against which each is used, and helpful practical notes for growers.

Blumer (S.) & Kundert (J.). **Die Peronospora der Rebe und ihre Bekämpfung im Jahre 1952.** [Vine *Peronospora* and its control in the year 1952.]—*Schweiz. Z. Obst- u. Weinb.*, 61, 25, pp. 526–529; 26, pp. 533–536, 1 graph, 1952.

In 1952 about half the grapes on untreated vines in the Zürich district of Switzerland were attacked by downy mildew (*Peronospora*) [*Plasmopara viticola*: *R.A.M.*, 32, p. 9], a low incidence by local standards. Absolute control was achieved by spraying with SR 406 [captan: 32, p. 685] at 0·25 to 0·5 per cent., while Bordeaux mixture (1 and 1·5 per cent. for pre- and post-blossom treatments, respectively), copper oxychloride dust (0·5 to 0·75 per cent.), and cuprosan (0·5 per cent.) permitted, respectively, 3·2, 2·5, and 4·1 per cent. infection compared with 51·7 for the untreated. In both 1951 and 1952 the admixture of 0·25 per cent. lime-sulphur with Bordeaux increased the amount of infection more than twofold. In 1952, on account of light rain on the day of the fourth treatment (16th June), the application of copper oxychloride was repeated the next day with excellent results.

Gambaryan (G. C.). Способ борьбы с Оидиумом. [A method of controlling *Oidium*.]—Сад и Огород [*Orchard & Garden*], *1953*, 5, p. 78, 1953.

Two applications of colloidal sulphur suspension (1 per cent.) are recommended for the control of vine *Oidium* disease [*Uncinula necator*: *R.A.M.*, 31, p. 166] in the U.S.S.R. A third application would be advisable in years when the disease is more severe. Colloidal sulphur plus Bordeaux mixture (both at 1 per cent.) was also effective against *U. necator* and against downy mildew [*Plasmopara viticola*: loc. cit. and preceding abstract] and is recommended whenever the diseases occur together.

Ciferri (R.). **Magnesio-carenza di Viti Nebiolo nell' Albese.** [Magnesium deficiency of Nebiolo Vines in the Alba region.]—*Notiz. Malatt. Piante, 1952*, 21, pp. 36–39, 1952. [English summary, p. 72. Mimeographed.]

In 1944 and 1945 ungrafted, not very old Nebiolo vines in the vicinity of Alba, Italy, developed interveinal chlorosis, remained stunted, and gave rather poor yields as a result of magnesium deficiency. The vines were sprayed early in May, 1952, with 0·5 per cent. magnesium sulphate [cf. *R.A.M.*, 32, p. 419] and by the middle of June the leaves had regained their normal appearance. Treatment with potassium chloride and sodium borate produced no apparent effect. Mature leaves of severely affected, untreated vines and of healthy vines, and young leaves from the same two sources and from plants sprayed with magnesium sulphate averaged, respectively, 0·17, 0·27, 0·23, 0·34, and 0·29 per cent. dry weight magnesium oxide.

Locke (L. F.). **Chlorosis experiments.**—*Proc. Amer. Soc. hort. Sci.*, 61, pp. 77–83, 2 figs., 1953.

Chlorosis of grape vines growing in highly calcareous soil in the southern Great Plains of Oklahoma has frequently been observed [cf. *R.A.M.*, 20, p. 516]. Various sulphates and mulches were applied, but the only treatment which corrected the chlorotic condition was ferrous sulphate at the rate of more than 1 lb. per plant. It gave quicker results when used in solution, and up to 60 lb. per vine was not injurious. About 120 other species of fruits, ornamentals, and crop plants were also benefited by treatment with ferrous sulphate if they were not too badly damaged by chlorosis beforehand.

Coombe (B. G.). **Control of black spot on Grape Vines.**—*J. Dep. Agric. S. Aust.*, 56, 12, pp. 562–564, 1 diag., 1953.

During the 1952–3 control trials at Renmark, South Australia, against vine anthracnose (*Elsinoe ampelina*) [*R.A.M.*, 32, p. 116], now widespread in the vine-growing areas, one application of 0·5 per cent. thiram three weeks before bud swell was the most effective treatment. The leaves at the 3-in. growth stage and at setting time were completely clean, whereas there was an average of 63 per cent. infection on the untreated. Berry infection was 1·7 per cent., as against 17 per cent. for the untreated. Berries on vines receiving in addition three spring cover sprays of 0·25 per cent. thiram or Bordeaux mixture (8–5–50, 6–4–40, and 3–3–50) were clean. Yield per vine ranged from 22 lb. (untreated) to 57 lb. for the winter and spring sprayed. Recommended control measures include the location of infected vines during the growing season, marking immediately and clearly for pruning definite affected areas; turning infected material under before bud burst or preferably burning the infected canes; and cover spraying the marked areas with thiram plus a white oil sticker (2 to 3 pts. per 100 gals.), or ziram (5 lb. per 100 if infection is severe, otherwise at 3 lb.) just before bud burst. Should infected shoots appear later a cover spray of thiram or ziram (1½ lb.) or a copper fungicide, e.g., Bordeaux mixture, is advised.

Martin (C.). **Isolement d'une souche du virus Y de la Pomme de terre (Marmor upsilon Holmes) à partir du Dahlia et de la Tomate.** [Isolation of a strain of Potato virus Y (*Marmor upsilon* Holmes) from *Dahlia* and Tomato.]—*Ann. Inst. nat. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 3, 3, p. 394, 1952.

At the Central Station of Plant Pathology, Versailles, in 1950 the author transmitted to healthy tomato plants from dahlias infected by tomato spotted wilt virus [*R.A.M.*, 25, p. 303] a virus which produced symptoms usually attributed to tomato spotted wilt. It was reisolated, and from inoculation and serological tests was

identified as potato virus Y. On reinoculation to tomato, symptoms identical with those originally seen were produced. These results were confirmed in 1951, further inoculations demonstrating that it is possible for dahlias to harbour potato virus Y.

Virus Y was also isolated from tomato plants growing in the field [cf. 31, p. 203].

BLACK (L. M.). **Viruses that reproduce in plants and insects.**—*Ann. N.Y. Acad. Sci.*, 56, 3, pp. 398–413, 1953.

The evidence reviewed in this monograph, that the viruses of rice stunt [rice dwarf virus], aster yellows, clover club leaf, and wound tumour [clover big-vein virus] multiply in both their insect and plant hosts, has already been noticed [*R.A.M.*, 18, p. 613; 20, p. 209; 30, p. 215; 32, p. 22]. The multiplication of the virus in the vector would seem to explain the frequent ability of these insects to remain infective throughout their whole life.

LAUFFER (M. A.). **Form and function : a problem in biophysics.**—*Sci. Mon., N.Y.*, 75, 2, pp. 79–83, 3 figs., 1952.

In this essay the author is concerned with the problem of identifying with certainty the ultimate particle which is the cause of a virus disease. In other words, the infectious entity must be related to the physical entity or characteristic particle. Taking southern bean mosaic virus as an example, it is shown how the sedimentation rates of the two entities can be determined and compared by ultracentrifugation. Electrophoresis and diffusion methods also offer promise for this purpose.

KLINKOWSKI (M.). **Die 'Bohnenwelke' der Phaseolus-Arten, die Bronzefleckenkrankheit der Tomate, die Vergilbungskrankheit und das Gelbnetzvirus der Rüben. Viruskrankheiten, die bisher in Deutschland unbekannt waren.** ['Bean wilt' of *Phaseolus* species, the Tomato spotted wilt disease, and the yellows disease and yellow-net virus of Beets. Virus diseases which were hitherto unknown in Germany.]—*Dtsch. Landw.*, 3, 12, pp. 636–639, 4 figs., 1952.

Descriptions are given of four viroses of recent introduction into Germany, namely, 'bean wilt' of runner beans (*Phaseolus* [*multiflorus*]), presumably identical with the black root of the United States [*R.A.M.*, 20, p. 620], first observed in 1946; tomato spotted wilt [32, p. 284]; beet yellows, which was originally detected in Westphalia in 1935 and 10 years later had already become responsible for immense losses [32, pp. 528, 529]; and beet yellow-net [31, p. 97].

Ley No. 4863. Decreto reglementario del 15 de Julio de 1908. Nomina de las 'plagas'. [Statute No. 4863. Regulative Decree of 15th July, 1908. List of 'pests'.]—*Misc. Publ. Minist. Agric., B. Aires*, 163 (cuarta edición [fourth edition]), 15 pp., 1953.

A complete list is given of pathogens declared to be 'pests' in Argentina by Regulative Decrees made on various dates based on Statute No. 4863 of 15th July, 1908, which is reprinted in full.

Pflanzenschutz-Tagung der Biologischen Bundesanstalt Braunschweig in Münster/Westf., 6.–10. Oktober 1952. [Plant Protection Conference of the Federal Biological Institute, Brunswick, at Münster, Westphalia, 6th to 10th October, 1952.]—*Mitt. biol. ZentAnst. Berl.* 75, 250 pp., 20 figs., 7 diags., 27 graphs, 1953.

The following were among the subjects discussed at the above-mentioned conference [cf. *R.A.M.*, 32, p. 539]. H. W. WHEELER (pp. 62–65) outlined the history,

organization, and scope of the plant quarantine service in the United States, where about 40 statutes and orders are now in operation.

W. Schoel (pp. 65–73) described the status and development since 1945 of the phytosanitary import quarantine in Western Germany from the phytopathological, administrative, and legal standpoints, together with its functions in relation to a European union.

H. Heddergott (pp. 74–79) outlined the organization of the plant protection service of Yugoslavia and referred to some of the main problems awaiting solution. Most of them have already been mentioned from time to time in this *Review*. The occurrence of *Pseudomonas tabacum* on tobacco and *Phytophthora erythroseptica* on potato (in Croatia) [C.M.I. map No. 83] is recorded.

H. Bremer (pp. 79–81) summarized his observations on the phytopathological problems arising in a predominantly dry climate, exemplified by that of south-western Anatolia, Turkey. One of the agents of root rot on various economic crops is *Colletotrichum atramentarium* [No. 190].

Following a summary of previous work on the application of antibiotics as seed disinfectants, M. Klinkowski (pp. 152–155) described preliminary experiments at the Martin Luther University, Halle a.d. Saale, on the control of barley stripe disease (*Helminthosporium gramineum*) and the loose smuts of barley [*Ustilago nuda*] and wheat (*U. tritici*) by 1½ hours' immersion of the grain in the culture filtrates of 16 isolates (18 for *U. tritici*) of actinomycetes and nine of *Penicillium* spp. The incidence of both *H. gramineum* and *U. nuda* was substantially reduced by the treatment, while one *Penicillium* isolate (IX) eliminated infection as completely as the mercurials abavit, ceresan, and germisan, used for comparison. Absolute control of *U. tritici* was effected by isolates of five actinomycetes and two of *Penicillium*, including strain IX.

Frl. H. Köhler (pp. 155–159) also reviewed some contributions to the use of antibiotics in plant pathology [*R.A.M.*, 30, p. 482] and reported on preliminary tests at the Aschersleben Phytopathological Institute with the culture filtrates of actinomycetes and *P.* spp. in the control of plant diseases. At concentrations of 1 per cent. and upwards, added to the culture solutions in which the plants were growing, two strains of *Streptomyces*, 153/3 and 253/4, were completely effective against *Alternaria circinans*, [*A. brassicicola*] on cauliflower [32, p. 462], a comparable action being exerted by *Penicillium* strain 17 at 5 and strain 14 at 10 per cent., while the untreated plants were severely attacked. In tests on *Puccinia simplex* [*P. hordei*] on barley the maximum number of pustules per plant (average values of ten plants) was eight, compared with 62 for the controls, while the corresponding figures for *P. dispersa* on rye were five and 64.

W. Rönnebeck (pp. 162–167) adduced experimental evidence for the superior performance of the progeny of Ackersegen and Aquila potatoes at Bonn-Poppelsdorf, a typical 'degeneration' area [cf. 32, p. 95], as compared with newly procured elite material of the same varieties. By 1951, after three years' local cultivation, stringent selection, combined with extermination of the aphid vectors with E. 605 [31, p. 348] and early lifting, had reduced the incidence of leaf roll and streak [potato virus Y] in the two varieties to 2 and 6·5 per cent., respectively. The yield was 13 to 14 per cent. higher than that of the elite. Further tests were undertaken on a field sprayed five times with systox [cf. 32, pp. 529, 639] to confirm this unexpected result, and in 1952 the yields of the progeny of the two locally grown, with one exception, again exceeded those of freshly procured elite (by over 20 per cent. in the case of Aquila), the incidence of virus infection in the former ranging from 4 to 8 per cent. in Ackersegen and from 0·2 to 3 per cent. in Aquila, while the corresponding values for the elite were 2·8 and 3·2. The higher productivity of the local provenance is attributed to its more rapid growth during the initial phase of two to three weeks under the influence of ecological factors.

The results of experiments conducted by F. GROSSMANN (pp. 168–172) at the Stuttgart-Hohenheim Plant Protection Institute, using Winter's method for the quantitative determination of fungal growth in natural soil [27, p. 123], confirmed previous observations as to the suppression of growth of *Ophiobolus graminis* [32, p. 269] by green manures. This effect is attributed in the first instance to the stimulus given to the development of the general soil microflora at the expense of the parasite. Thus, counts revealed increases of 400 to 1,200 in the fungal population and 400 to 800 per cent. in the bacterial.

A. HEY (pp. 173–175) outlined the history of potato wart disease (*Synchytrium endobioticum*) and traced its continuous extension in Germany [31, p. 421]. The following are the objectives of a sanitation project formulated in 1949 for the infection centres of Giessübel and Pappenheim: (1) by 1952 provision of a quarantine ring of wart-immune varieties and selections extending over a radius of 10 km. from the foci; (2) by 1955 provision for the entire infested area of varieties immune from all known biotypes of the fungus and of maximum productivity; (3) by 1960 an embargo on the cultivation of susceptible varieties in the entire contaminated zone; and (4) thorough screening of all newly notified infection foci for the presence of aggressive biotypes by the use of test varieties.

Inoculation experiments on an assortment of wild potatoes with the 'normal' strain of *S. endobioticum* and the Giessübel (G) biotype [22, p. 273] gave positive results on *Solanum chacoense* and *S. antipovizcii*, but *S. araccpapa* and all the available varieties of *S. demissum* remained healthy. The results of several years' comparative laboratory and field experiments have demonstrated the indispensability of the latter in trials of varietal reaction, more especially to the G biotype. With the aid of a test assortment comprising the varieties Fram, Ackersegen, Orion, Carnea, Frühbote, Sickingen, and a selection designated Asche-Sämling, all the highly aggressive races localized in east Germany were found to represent specific biotypes of *Synchytrium endobioticum*. On this basis the varieties at present approved for cultivation fall into three groups: (1) those immune from all known biotypes, including Fram, Hilla, and Mira; (2) those susceptible to all known biotypes, e.g., Ackersegen, Robusta, and Sabina; and (3) Carnea, Frühbote, Sickingen, and others varying in their response to the several biotypes.

Discussing the connexion between rotational diseases and weed infestation, with special reference to take-all of wheat [*O. graminis*: 29, p. 205], H. BOCKMANN (pp. 179–180) reported counts of up to ten times as many weeds with a green weight 30 times as high in diseased as in healthy wheat stands in Schleswig-Holstein. The results of pot experiments showed that infected wheat plants consumed 20 per cent. less water than healthy ones. Another reason for the luxuriance of weeds in diseased wheat crops is the reduction in the shading capacity of the sparse, stunted plants. Couch grass [*Agropyron repens*] is specially prevalent in stands affected by take-all and serves as a carrier of the pathogen. The weed population should therefore be considered in the arrangement of a rotation. For instance, the strong predisposition to foot rot induced by the barley-colza-wheat sequence is attributable not only to the brief one-year interval between the two susceptible cereals, but also to the persistence of the barley weed flora in the colza intercrop.

P. HUS (pp. 210–211) considered potential improvements in Dutch control methods for apple scab [*Venturia inaequalis*: 32, p. 539] in the light of American experience and reported the results of spraying experiments carried out in 12 localities, using aaventa [31, p. 477] for the first four applications on 29th April, 6th and 28th May, and 9th June, each following within two days the estimated infection dates, and thiovit [28, p. 461] for the fifth on 2nd July. The first scab spots on the leaves, resulting from infection on 27th and 28th April, were detected on 13th May, the incidence on 16th June being estimated at 57 per cent. for the unsprayed, 34 per cent. for the trees given preventive treatment prior to the fore-

cast infection dates, and 6 per cent. for the post-infection series, while the corresponding figures for the fruit on 13th August were 43, 32, and 6 per cent.

E. L. Loewel (pp. 211–215), summing up the results of recent years' experiments in north-western Germany on the control of apple scab and pear *Fusicladium* [*V. pirina*], with special reference to the former [32, p. 540], was of the opinion that intensive studies on ascospore flights and the conditions for spore germination have led to a multiplication of sprays at increased expense rather than to the expected reduction in both numbers and cost. In 1952, for example, there was no correlation between the extent of ascospore flights and the incidence of infection, heavy outbreaks having followed apparently negligible ejections. The omission of the first and second post-blossom treatments, especially the former, resulted in a drop of 5 to 10 per cent. in the percentage of sound fruits as compared with the full schedule of 10 applications [cf. 32, p. 666].

M. Ehlers (pp. 228–232) described a method used at the Schering A.G., Berlin, based on that of Görnitz [12, p. 577], for the laboratory assay of plant-protectives in respect of resistance to washing-off by rain and its application, *inter alia*, to four copper sprays tested on maple [*Acer*] leaves and to two wettable sulphurs and two organic fungicides used in apple scab control. A ground glass plate 20 cm. in diameter is covered with the test material and allowed to dry, after which it is suspended vertically and subjected to 24 hours' continous rain striking it perpendicularly by a laboratory device. The loss in weight is taken as a measure of the amount of material washed off. The method was also tested with leaves in place of the plate and by chemical analysis and a biological test. The four copper compounds differed considerably in their ability to withstand washing-off. The laboratory estimation of the scab fungicides paralleled the results obtained (percentage of scab-free fruit) in orchard tests with the same preparations used for one pre- and four post-blossom applications.

Report of the Mediterranean Plant Protection Conference on pests and diseases of special interest to the Mediterranean countries (Sicily, 20–23 October 1952). —23 pp., Paris, European Plant Protection Organization. [French version.]

In this report are listed five diseases not hitherto reported in Mediterranean areas, and whose introduction would lead to serious damage to citrus and other fruits. Notes are given on the distribution, host range, and transmission.

Quick decline virus disease (tristeza) [not yet established that these are the same: *R.A.M.*, 32, p. 428] is reported to occur in China. Governments are recommended to organize grafting tests in view of the success of Algeria [31, p. 432] in preventing the introduction of the disease. Quarantine action seems the most effective preventive measure also against citrus bacteriosis or canker (*Xanthomonas citri*) [C.M.I. map No. 11], as the disease has been eradicated by this means from a number of areas [loc. cit.], including Mozambique. For the Mediterranean area pink disease (*Corticium salmonicolor*) [No. 122] is the most dangerous potential fungus disease. Compulsory pre- or post-entry disinfection of host plants was recommended by the conference.

Phoma [*Guignardia*] *citricarpa*, black spot of citrus, though present in Georgia (U.S.S.R.) [No. 53], has not yet spread to any European or Mediterranean country. The same restrictions as for *X. citri* are recommended.

Against lucerne dwarf virus disease of vine [*R.A.M.*, 30, p. 303] the conference recommended the adoption of grafting tests or a complete embargo on the importation of vine plants from infested areas.

Annual Report East African Agriculture and Forestry Organization, 1952.—101 pp., 1 pl., [? 1952].

In the plant pathology section (pp. 35–42) of this report [cf. *R.A.M.*, 32, p. 63]

H. H. Storey and Mrs. A. K. Ryland in their work on virus diseases of groundnuts have shown that mildly mottled plants infected only with mosaic rosette [loc. cit.] are immune from normal rosette virus. Attempts to transmit rosette to other leguminous plants were unsuccessful. Two other types of leaf mottle transmitted by grafting but not by *Aphis craccivora* have been detected. F[rances] M. L. Sheffield has demonstrated that the sweet potato suffers from a number of virus diseases. Further tours in Kenya and Tanganyika confirmed previous observations [loc. cit.] that the mosaic-type diseases spread more rapidly at medium altitudes than at high, and that at low altitudes there was no spread at all. Different sweet potato varieties exhibit widely different symptoms when infected with the same virus.

Further work by D. Rudd Jones on cypress canker (*Monochaetia unicornis*) [loc. cit.] at Chehe showed that the percentage of cankers remaining active seven months after inoculation on *Cupressus macrocarpa* was 63·2, *C. lusitanica* 20·6, *C. arizonica* 11·1, *C. benthami* 6, and *C. torulosa* 0·6. Resistance and susceptibility to the disease are bound up with host reaction, presumably in the formation of a wound periderm. The rate of initial extension of cankers is greatest in the most rapidly growing trees, irrespective of host reaction. A long, dry spell following good rainfall resulted in a large number of *Pinus radiata* trees being killed by *Armillaria* root rot [*A. mellea*].

H. H. Storey and Mrs. A. K. Ryland record that all the East African varieties of maize are susceptible to *Puccinia polysora* [32, p. 676].

Breeding (pp. 42–46) for the production of cassava varieties resistant to two virus diseases (brown streak and mosaic) [30, p. 140; 32, p. 63] was continued by L. R. Doughty, D. W. Gourlay, and D. L. Jennings. In some areas these varieties have come into cultivation and there are reports of large improvements in yields.

Little progress has been made in the work of L. R. Doughty in breeding maize resistant to streak [virus] disease [32, p. 366], owing to difficulty in maintaining cultures of the vector, *Cicadulina*.

In the Plant Physiology Section (pp. 48–53) J. Glover reports that bud disease (*Ramularia bellunensis*) [32, p. 627] of pyrethrum [*Chrysanthemum cinerariifolium*] was reduced from 18 to 2 per cent. or less by the application of Bordeaux mixture (plus 0·4 per cent. liquid detergent) at the rate of 200 gals. per acre every ten days. Bud production was significantly higher on sprayed plants. It appears that there is a direct correlation between the number of diseased buds and the number of hours during which the temperature fell below 50° F. 13 weeks earlier.

Annual report for the fiscal year ending June 30, 1951.—*Bull. Mass. agric. Exp. Sta.* 466, 62 pp., 1951.

In this report [cf. *R.A.M.*, 31, p. 226] W. L. Doran of the Department of Botany (pp. 13–18) states that the growth of cabbage plants in both uninfested soils and those infested with *Plasmodiophora brassicae* [32, p. 352] was improved, but more so in the latter, by the addition of ground limestone and mercurous chloride in commercial fertilizers. Technical chlorobromopropene (25 per cent. by weight, active) at 0·5 gm. per sq. ft. soil controlled damping-off of beet, cabbage, and tomato seedlings, but did not control club root [see above, p. 5].

In work by E. F. Guba two further generations of three new hybrid red tomatoes were selected for resistance to *Cladosporium fulvum* [32, p. 700] and fruiting type: No. 4 has much larger fruit than Improved Bay State [31, p. 227]; Hybrids Nos. 2 and 3 are immune from leaf mould. It is stated that in Missouri resistance to *C. fulvum* in Improved Bay State has been combined with resistance to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*], while in Wisconsin a pink tomato has been developed with resistance to *C. fulvum* derived from Improved Bay State.

According to W. L. Doran phygon XL [32, p. 406] used at 0·3 gm. per l. for 24

hours with indolebutyric acid in solution improved the rooting of softwood cuttings of *Cornus florida*, *Clethra barbinervis*, and *Rhododendron calendulaceum* and of leaf-bud cuttings of *R. catawbiense* more effectively than did indolebutyric acid used alone. Used in this way, phygon XL without the rooting compound also improved the rooting of *R. catawbiense* cuttings. Rooting of autumn and winter cuttings of conifers was more improved by powder-dip treatment with phygon XL, alone or with talc (1:1), or hormodin No. 3 (1:2) used with root-inducing substances than with the latter alone and used as solutions. The percentages of rooted hemlock (*Tsuga canadensis*) cuttings were increased by powder-dip treatment with phygon XL alone or variously diluted.

E. F. Guba reports that stippen or Baldwin spot [bitter pit: 3, p. 275; 30, p. 168] was most prevalent at harvest on apples from irrigated trees; it did not increase after four months' storage.

Chemicals showing promise as soil disinfectants were applied by E. F. Guba and R. W. Ames to soil in a mixture with sand at regular intervals for the control of carnation wilt diseases. Control of *Rhizoctonia* stem rot [*Corticium solani*: 31, p. 227], plant tolerance, and yield were considered in evaluating the treatments. A loss from *C. solani* of 20·3 per cent. in untreated beds was reduced to 3·6, 4·2, and 5·7 per cent. by new improved ceresan, fermate, and semesan, respectively. In practice, however, this loss can be largely avoided by shallow planting and good culture. Phenyl mercuric acetate at a dilution twice that recommended for plant protectant spraying applied at monthly intervals (at 1 pint per sq. ft.) also gave some control. In general, the soil application of fungicides to carnation beds for the control of systemic wilt diseases is not considered advisable, as *Fusarium* wilt [*F. dianthi*: loc. cit.] and *Phytomonas* [*Pseudomonas caryophylli*: loc. cit.] are not controlled [see below, p. 28].

Studies by L. H. Jones demonstrated that no symptoms of tobacco frenching [32, p. 698] appeared when the soil temperature was 70° F. or less. A reduction from 95° to 70° caused each new leaf on an affected plant to appear less frenched, until finally the new leaves were normal. John Baer tomato and *Nicotiana glauca* plants developed abnormalities when exposed to the frenching factor at a high soil temperature, but California Wonder [chilli] pepper was not susceptible. The evidence indicates that frenching is caused by a soil-borne organism which at a high soil temperature affects some basic nutrient supply or creates a toxin which is absorbed by the plant [loc. cit.]. Plants at a soil temperature of 95° and a pH range of 5·5 to 7·4 frenched earlier, symptoms being more intense where lime was applied to raise the pH. With more lime there was a lag at pH 7·9. It required 46 days for frenching to appear at pH 8·07 compared with 16 days in non-limed soil. At pH 8·32 no frenching appeared in 75 days.

In the pomology report (pp. 45–49) J. S. Bailey and M. Drake state that the first case of magnesium deficiency in cultivated blueberries [*Vaccinium* spp.] in Massachusetts was found in the summer of 1949 in young bushes in Middleboro. Interveinal areas of the leaves were yellow and red, the discoloration starting at the tip and spreading along the margins. The average magnesium content of the leaves was 0·049 per cent. (dry weight). The soil was very acid (pH 3·8 to 4·2). A year after application varying amounts of Epsom salts and dolomitic limestone had increased the magnesium content of the leaves; 100 to 200 lb. of magnesium oxide as dolomitic limestone was more effective than 25 or 50 lb. as Epsom salts. When cultivated blueberries are affected by magnesium deficiency a single application at the rate of 100 lb. magnesium oxide per acre should correct the trouble. This amount is provided by 500 lb. dolomitic limestone (20 per cent.) or by 600 lb. Epsom salts.

In the report of the Department of Shade Trees Laboratories (pp. 53–55) M. A. McKenzie, D. H. Marsden, W. E. Tomlinson, P. L. Rusden, R. L. Coffin, and

J. G. Moline state that during the year under review Dutch elm disease (*Ceratostomella ulmi*) was found in 27 more towns [cf. 29, p. 605; 32, p. 521]. D. H. Marsden records that a number of wound paints failed to kill the spores of *C. ulmi* in periods of contact ranging from one to 11 days. White shellac, Bordeaux paint, a natural latex compound, and tree wood paints containing wood creosote oils killed the spores after one day's contact. The addition of 25 per cent. by volume of shellac to the non-toxic paints rendered them toxic.

Volcani (Zafrira), Riker (A. J.), & Hildebrandt (A. C.). **Destruction of various tissues in culture by certain bacteria.**—*Phytopathology*, 43, 2, pp. 92–94, 1 fig., 1953.

At the Department of Plant Pathology, University of Wisconsin, Madison, six bacterial soft rot organisms of the *Erwinia carotovora*, *E. aroideae*, and *E. atroseptica* groups, as well as *Bacillus subtilis* and *B. polymyxa* were grown on tissue cultures of carrot, periwinkle [*Vinca rosea*], potato, and marigold [? *Calendula officinalis*], which were moistened with sterile distilled water suspensions of the organisms. They all induced a definite discoloration of carrot tissue, which was completely softened by an isolate of *E. aroideae* from tobacco in Uganda, *E. atroseptica* from potato (New York and Scotland [*R.A.M.*, 32, p. 642]), and *B. polymyxa* from chilli (Israel), the last-named alone, however, causing total disintegration. Marigold tissue collapsed under the attacks of all the bacteria but was entirely disorganized by *B. polymyxa*. *E. aroideae* and *B. polymyxa* caused disintegration of potato tissue, *E. atroseptica* and *E. phytophthora* [a strain of *E. carotovora*] partial softening, and *E. carotovora* from celery (Cambridge, England) and *B. subtilis* from chilli (Israel) softening of the upper layers only [cf. 31, p. 320]. Slight discoloration was the only effect produced on *V. rosea* by *E. aroideae* and *E. atroseptica*, while *B. polymyxa* caused partial softening of the tissue. *B. subtilis* was without effect.

The metabolites in the fermented media from the organisms caused delay in growth and diminution in the size of the carrot tissue.

Classification of the Bacteriaceae. A memorandum.—*Int. Bull. bact. Nomencl. Tax.*, 2, 4, pp. 137–140, 1952.

This memorandum, drawn up by the British Bacteriaceae Subcommittee, comments on the recognition of minor antigenic differences between strains and the description of many new species on this basis. The subcommittee suggests that the biochemical separation of the Bacteriaceae into groups is adequate for most purposes; that the number of species in the different groups should be limited; and that, if classification by antigenic analysis is extended to the whole family, identical antigens, in whatever group they occur, should bear only one designation.

Lwoff (A.). **Lysogenic bacteria, I, II.**—*Endeavour*, 11, 42, pp. 72–77; 43, pp. 132–136, 1 pl., 2 diags., 2 graphs, 1952.

Information is given on certain well-established facts concerning lysogenesis [cf. *R.A.M.*, 31, p. 55] and on the behaviour of certain bacteria which multiply normally in a lysogenic population while others lyse with liberation of bacteriophages. In the lysogenic bacteria the bacteriophage appears as a type of potential virus, a probacteriophage, which is neither infective nor pathogenic but in certain circumstances may develop into a bacteriophage. The latter, if liberated by bacterial lysis, is able to infect and lyse sensitive bacteria belonging to the same or related species. The production of bacteriophages is hereditary in lysogenic bacteria.

The second paper deals with the ultra-violet radiation shock treatment, which initiates the development of probacteriophage into bacteriophage, and the factors affecting it; chemical induction of phage production; and the latent period.

Stapp (C.). **Der derzeitige Stand unserer Kenntnisse über pflanzliche Tumoren.** [The actual status of our knowledge of plant tumours.]—*Zbl. Bakt.*, Abt. 2, 107, 8–10, pp. 172–189, 1953.

Up-to-date information on crown gall (*Bacterium tumefaciens*) of plants is summarized from 65 contributions to the literature, nearly all of which have been noticed in this *Review*.

Paris (Denise) & Duhamet (L.). **Action d'un mélange d'acides aminés et de vitamines sur la prolifération des cultures de tissus de crown-gall de Scorsonère : comparaison avec l'action du lait de Coco.** [Action of a mixture of amino acids and vitamins on the proliferation of cultures of *Scorzonera* crown gall tissue: comparison with the action of Coco-nut milk.]—*C.R. Acad. Sci., Paris*, 236, 17, pp. 1690–1692, 1 graph, 1953.

A mixture of the amino acids and vitamins (B complex and folic acid) present in coco-nut milk was shown to exert a stimulatory action on *Scorzonera* tissues infected by crown gall [*Bacterium tumefaciens: R.A.M.*, 32, pp. 474, 548] comparable with that of the milk itself [29, p. 408; 32, p. 219].

Braun (A. C.). **Organisation of crown-gall tumor cells in the presence of a formative stimulus.**—*Phytopathology*, 43, 4, pp. 204–205, 1 fig., 1953.

At the Rockefeller Institute for Medical Research, New York, seven out of 53 (13 per cent.) slowly growing fragments of crown gall [*Bacterium tumefaciens*] from periwinkle (*Vinca rosea*) stems, planted on White's medium containing 1, 0·1, or 0·01 mg. α-naphthalenic acid per ml. [*R.A.M.*, 26, p. 289] had developed one or more roots by the end of eight weeks [cf. 31, p. 175], the three concentrations being equally effective. At the close of the experiment one of the 40 control cultures (without the growth substance) had produced a root. In a second test 11 out of 60 tumour tissue fragments (about 18 per cent.) formed up to 23 roots within two months, whereas none of the 60 controls developed any. Negative results were obtained in a comparable series of experiments with completely altered, rapidly growing tumour tissues from the same host, but it is suggested that if a sufficiently powerful stimulus were applied organization and recovery might be possible.

Moreau (F.) & Moreau (Mme). **Sur le développement du Ceratocystis moniliformis (Hedgcock) nov. comb.** [On the development of *Ceratocystis moniliformis* (Hedgcock) n.comb.]—*Rev. Mycol.*, 17, 2, pp. 141–153, 4 figs., 1952.

A full account is given of the perithecial development of a fungus isolated from cacao in Madagascar and considered by Luc to be *Ophiostoma moniliforme* f. *theobromae* [*R.A.M.*, 32, p. 453], which the authors transfer for reasons of priority to *Ceratocystis moniliformis* n. comb. [? antedated by Moreau: 32, p. 454]. The fungus resembles *Melanospora zamiae* (*Ann. Bot., Lond.*, 42, pp. 255–269, 1928) in the degeneration of part of the ascogonium (central in *C. moniliformis*, peripheral in *M. zamiae*), the production of asci in short chains, and the liberation of ascospores by gelatinization of the ascus wall. An attempt should be made to ascertain whether species of *Ceratocystis* should be placed near some species of *Melanospora*.

Johnson (T.). **Variation in the rusts of cereals.**—*Biol. Rev.*, 28, 2, pp. 105–157, 1 diag., 1 graph, 1953.

The problem of physiologic specialization in the cereal rusts (*Puccinia* spp.) is fully discussed, with special reference to its relation to the production and cultivation of new varieties, in the light of important contributions to the literature, which are listed in a nine-page bibliography.

Batts (C. C. V.). **The distribution, host range and seasonal development of Puccinia graminis Pers. in south-east Scotland.**—*Trans. bot. Soc. Edinb.*, 36, 1, pp. 48–57, 1 pl., 2 maps, 1952. [Received November, 1953.]

Following the severe outbreak of *Puccinia graminis* in south-eastern Scotland [*R.A.M.*, 31, p. 278] in 1945, investigations showed that the alternate hosts *Berberis vulgaris* [28, p. 165] and *Mahonia aquifolium* were frequently found in the area. In addition to cereals black rust occurs here on 14 genera of wild grasses. There is no evidence that the rust overwinters except by teleutospores.

Abdel-hak (T.). **Physiological races of Wheat stem rust in Egypt.**—*Nature, Lond.*, 172, 4383, pp. 802–803, 1953.

Wheat stem rust (*Puccinia graminis*) causes an average annual loss of 10 per cent. of the total Hindi wheat crop in Egypt [*R.A.M.*, 27, p. 357] amounting to about 500,000 erdebs (1 erdeb = 150 kg.) worth £2,000,000 (Egyptian).

In 1949 races 9, 14, 17, 19, 21, 24, 42, 88, and 123 were present, together with a new one, designated E_1, similar to 17 and to which Acme was resistant. Race 17 was the most prevalent, occurring in 47·85 per cent. of the total isolates, followed by 21, 19, and 14. In 1950 race 53 was detected but 17 again predominated, followed by 19, 42, and 21. Race 59 was identified for the first time in Egypt in 1951 and E_1 reappeared in 1952. Race 17 again predominated in both years and was present on several wheat varieties received from Cyprus [31, p. 109].

In experiments to determine the seedling stage reaction of numerous wheat varieties and strains to the various races, 59 varieties were found to be resistant to races 14, 17, 19, 21, and 42 in 1949; 20 resisted races 9, 14, 17, 19, 21, and 42 in 1950; in 1951 43 resisted 17, 19, 21, 24, and 42, all except Bobin-Gaza-Bobin retaining their resistance in the adult stage; and in 1952 42 varieties and strains were seedling resistant to races 9, 14, 17, 19, 21, 59, and E_1.

From these results it is concluded that race 9 is the most virulent, followed by 21, 17, 19, 14, 42, 59, and E_1 in that order. It is noteworthy that most of the resistant strains were promising lines produced locally by hybridization with some of the introduced varieties, in contrast to many of the latter which were highly susceptible under Egyptian conditions.

Kozhevnikova (Mme L. M.). Солнечное облучение семян яровой Пшеницы как мера борьбы против пыльной головни. [Solar treatment of spring Wheat seed as a control measure against loose smut.]—Агробиология [*Agrobiology, Moscow*], *1953*, 3, pp. 41–46, 1953.

In studies at the Dokuchavev Agricultural Institute, Voronezh District, U.S.S.R., three and seven days' solar treatment [cf. *R.A.M.*, 32, p. 179] of spring wheat grain increased germination from 76·5 and 80·5 (controls) to 89 and 92 per cent., respectively, increased vigour, and reduced loose smut (*Ustilago tritici*) [32, p. 369] in the succeeding crop from 1 per cent. in the untreated to 0·06 per cent.

Holton (C. S.). **Observations and experiments on snow mold of winter Wheat in Washington State.**—*Plant Dis. Reptr*, 37, 6, pp. 354–359, 4 figs., 1953. [Multilithed.]

This is a report on the results of studies carried out from 1945 to 1948 in Washington on snow mould of winter wheat [see next abstract] caused by *Typhula idahoensis* [*R.A.M.*, 30, p. 265], *T. itoana* [loc. cit.], and *Fusarium nivale* [*Calonectria nivalis*: 29, p. 255]. Most of the information has already been noticed [loc. cit.]. The severity of the disease in early spring does not necessarily indicate its final destructiveness since many plants may recover. No resistant variety was found.

Sprague (R.). **Fungicidal control of snow mould of winter Wheat in Washington.** —*Plant Dis. Reptr*, 37, 6, p. 360, 1953. [Multilithed.]

In small-scale plot experiments at the Washington State College Tree Fruit Experiment Station, Wenatchee, 5 lb. ceresan M in 75 lb. nugreen per acre applied on 14th November, 1952, gave the best control of snow mould (*Typhula* spp. [*T. idahoensis* and *T. itoana*] and *Fusarium nivale* [*Calonectria nivalis*: see preceding abstract]) on winter wheat, followed by PMAS (5 pints per acre) and ceresan M in talc (5 lb.), resulting in 90, 60, and 45 per cent. survival of green leaf surface, respectively, three and four months after treatment compared with 10 per cent. of the untreated.

Popov (V. I.). О зараженности семян яровой Пшеницы грибами, влияющими на всхожесть. [On the infection of winter Wheat seed by fungi which affect germination.]—Советск. Агрон. [*Soviet Agron., Moscow*], *1953*, 2, pp. 88–89, 2 figs., 1953.

In studies at the Phytopathological Laboratory of the Voronezh Station of Plant Protection, U.S.S.R., grain of the winter wheat variety Lutescens 62 was found to be heavily infected by an *Alternaria* species [see next abstract] and also *A. tenuis* [*R.A.M.*, 12, p. 160]. The former penetrated deeply into the seed and was much more parasitic. Liquid seed treatments did not give satisfactory control, but dusts, especially granosan, were most effective, caused no injury to the embryo, and increased germination from 74 (not treated) to 92 per cent.

Shaw (Dorothy E.) & Valder (P. G.). **A study of the microflora of Wheat grains in New South Wales.**—*Proc. Linn. Soc. N.S.W.*, 77 (*1952*), 5–6, pp. 307–322, 1953.

Alternaria spp. were the fungi most commonly isolated from surface-sterilized wheat grains [*R.A.M.*, 31, pp. 177, 596, and preceding abstract], bacteria and *Penicillium* spp. also constituting a large part of the surface flora. *Helminthosporium sativum* was isolated from 0·5 per cent. of grains [loc. cit.]. The only other wheat pathogens encountered were *Septoria nodorum* [loc. cit.] and *H. tritici-repentis* [see next abstract], the latter being particularly associated with pink coloration of the grains.

Valder (P. G.) & Shaw (Dorothy E.). **Yellow spot disease of Wheat in Australia.** —*Proc. Linn. Soc. N.S.W.*, 77 (*1952*), 5–6, pp. 323–330, 1 pl., 1 fig., 1953.

Yellow spot disease of wheat (*Helminthosporium tritici-repentis*) [*R.A.M.*, 31, p. 323 and preceding abstract] was recorded in New South Wales and southern Queensland in 1950. Since then the disease has been found to be widespread in the northern half of New South Wales. It caused a severe leaf blight and also attacked seedlings heavily, but dry conditions prevented further development. The disease will probably prove to be unimportant as it is favoured only by unusually wet weather.

Chattopadhyay (S. B.). **Root rot and foot rot of Wheat caused by Sclerotium rolfsii Sacc. and Curvularia specifera (Bainier) Boedijn (= Helminthosporium tetramera McKinney).**—*Sci. & Cult.*, 19, 2, pp. 101–102, 1953.

In isolation studies at the State Agricultural Research Institute, Calcutta, *Sclerotium rolfsii* [*R.A.M.*, 11, p. 545] and *Curvularia specifera* [*C. spicifera*: 15, p. 824] were found to be responsible for foot and root rot and foot rot, respectively, of wheat seedlings in West Bengal. Within 15 days of germination in inoculated soil, seedlings became infected and died gradually, there being some 50 to 60 per cent. deaths after three weeks.

Fellows (H.) & Schmidt (J. W.). **Reaction of Agrotricum hybrids to the virus of yellows streak mosaic of Wheat.**—*Plant Dis. Reptr*, 37, 6, pp. 349–351, 1953. [Multilithed.]

Hybrids between *Agropyron* species and wheat were tested in the greenhouse at Kansas State College, Manhattan, for resistance to the yellow streak mosaic virus [a strain of wheat mosaic virus: *R.A.M.*, 31, p. 235; 32, p. 551] during the winter of 1951–2. A wide range of reaction, based on the presence or absence of mottling, was observed, though the virus was shown to be present in symptomless plants. All the four hybrids tested, Chinese × *A. elongatum* × Pawneee, wheat × *A. elongatum*, wheat × *Agropyron*, and wheat × *A. trichophorum*, appeared to be probable or favourable sources of resistance [cf. 32, p. 672], but the more wheat-like the hybrid, the less resistance was retained. Of the check plants inoculated, 26·3 per cent. of the somewhat resistant Triumph, 6·2 per cent. of the susceptible Marquillo-Oro × Pawnee (C.I. 12851), and all the *A. elongatum* and *A. intermedium* plants were free from symptoms.

Guyot (L.) & Massenot (M.). **Sur une Urédinée, parasite des Graminées, ayant sa phase écidienne sur Clematis.** [On a rust, parasitic on Gramineae, with its aecidial state on *Clematis*.]—*C.R. Acad. Sci., Paris*, 234, 16, pp. 1631–1634, 1952.

In inoculation experiments from 1948 to 1950 with 21 aecidial isolates of *Puccinia hordei-maritimi*, collected in the south of France on *Clematis* spp., uredo- and teleutosorus development was secured on rye (71 per cent. positive results) and on a number of grasses. Chlorotic lesions developed on barley. In its remarkable pleophagy *P. hordei-maritimi* is considered to present close analogies with *P. glumarum* and *P. persistens*, both of which it resembles in morphological characters.

Mehta (P. R.), Singh (B.), & Mathur (S. C.). **Varietal reaction to stripe disease of Barley.**—*Sci. & Cult.*, 19, 3, p. 152, 1953.

In recent years barley stripe disease (*Helminthosporium gramineum*) has caused some 20 to 40 per cent. infection or more in the Uttar Pradesh, India [*R.A.M.*, 15, p. 86]. The results of varietal resistance trials carried out at the Laboratory of the Government Plant Pathologist, Kanpur, in 1950–3 are discussed here. Barley varieties under test in the field each received three hand-sprayer inoculations with a spore suspension of *H. gramineum* between the time of flowering and seed formation. Grain obtained from these heads was inoculated during sowing with the powdered material from affected leaves, which had been stored in a refrigerator throughout the summer. Since the disease is more severe in late than in normal sowings, the varieties were sown late on two dates at an interval of 15 days. K 12, resistant to covered smut (*Ustilago hordei*) [32, p. 75], CN 292, huskless and high-yielding, and 42/72 were highly resistant (no infection), while Ballia was resistant in two seasons and developed slight infection in the third; C 84, C 255, NP 13, C 50, K 2, K 8, and 42/69 were moderately resistant. The popular varieties C 251 and NP 21 proved susceptible, developing 10 to 20 per cent. or more infection.

Nilsson (L.). **Gräsmjöldagg—en aktuell parasit.** [Grass mildew—a topical parasite.]—*Försök o. Forskn.*, 9, 8–9, p. 63, 1952.

As in 1951, mildew (*Erysiphe graminis*) frequently preceded black rust [*Puccinia graminis*] on cereals in Scania, Sweden [*R.A.M.*, 32, p. 11] in 1952, but the former was more severe, especially on summer barley, in 1952, the critical months for infection (May and June) being exceptionally humid. Wheat and rye were also attacked to a lesser extent, but oats were clean. Attacks may be mitigated by the avoidance of predisposing factors, e.g., dense and late sowing, poor drainage, heavy

applications of stable manure, and proximity to winter barley stands, whence infection commonly proceeds.

HOPFENGART (M.). **Die Veränderung der Mehltauanfälligkeit von Sommergerste bei verschiedener Mineralsalzernährung.** [The alteration of mildew susceptibility in summer Barley through differential mineral salt nutrition.]—*Z. Acker- u. PflBau*, 96, 1, pp. 75–100, 2 figs., 3 graphs, 1953.

At the Technical Institute, München-Weihenstephan, Bavaria, Germany, summer barley seedlings of intermediate reaction to mildew (*Erysiphe graminis*) [*R.A.M.*, 31, p. 378] proved to be the most suitable material for experiments to determine the influence of mineral salt nutrition on the course of the disease. The two physiologic races used in the studies, A_2 and B, appeared to be identically affected by the various amendments and the predisposition to infection of the several varieties was modified uniformly by differential nutrition, the changes being most pronounced in Isaria and Haisa II and least so in Svalöfs Siegesgerste [Victory barley].

In all the varieties heavy applications of potassium clearly enhanced resistance to the pathogen; they operated most efficiently in the company of the silicate ion and least so with nitrate; chloride, sulphate, and phosphate were intermediate in the order named. Using potassium and nitrogen at normal rates, medium amounts of phosphoric acid (5/n) produced the maximum increases in susceptibility, deficiency and excess both tending to promote resistance. Of the phosphates potassium exerted the strongest and calcium the weakest effect, while the sodium salt was intermediate. In general, however, the influence of phosphoric acid on predisposition to mildew was far less significant than that of potassium. Susceptibility was uniformly increased by nitrogen, especially in the form of sodium nitrate.

MIZUKAMI (T.). **Observations on the reactions of plant to the infection of some pathogens. I. On the difference of the influence of the Barley juice on the conidial germination of Fusarium nivale and Fusarium solani.**—*Ann. phytopath. Soc. Japan*, 17, 2, pp. 57–60, 1 diag., 1953. [Japanese, with English summary.]

The germination of conidia of *Fusarium solani* and *F. nivale* [*Calonectria nivalis*] was better in sap from ground barley leaves than in distilled water, but was less in boiled sap. Inhibition of *F. solani* (non-pathogenic) was significant in drops of distilled water which had been left on needle-pricked barley leaves and collected after 24 hours and was checked completely when the conidia were placed in the drops on wounded areas. No such inhibitory effect was observed with *C. nivalis*.

QUINLAN-WATSON (F.). **The effect of zinc deficiency on the aldolase activity in the leaves of Oats and Clover.**—*Biochem. J.*, 53, pp. 457–460, 1953. [Abs. in *Abstr. Publ. Pap. & List Transl.*, 1, 7, p. 2, 1953.]

Experimental evidence demonstrated that the aldolase activity in the leaves of Algerian oats and subterranean clover (*Trifolium subterraneum*) was materially diminished in zinc-deficient plants.

BOURIQUET (G.). **La rouille américaine du Maïs causée par Puccinia polysora Underw. présente à Madagascar.** [American rust of Maize, caused by *Puccinia polysora* Underw., present in Madagascar.]—*Agron. trop., Nogent*, 8, 4, p. 428, 1953.

Maize rust (*Puccinia polysora*) [cf. *R.A.M.*, 32, p. 620; C.M.I. map No. 237] is reported to be present in Réunion, eastern Madagascar, and Mauritius.

Converse (R. H.) & Nagel (C. M.). **Sorghum seed treatment in South Dakota.**—*Plant Dis. Reptr*, 37, 7, pp. 401–403, 1953. [Multilithed.]

From 1948 to 1952, 33 fungicides were evaluated at Brookings and Highmore, South Dakota, as seed treatments for the sorghum variety Norghum [cf. *R.A.M.*, 32, p. 549]. Of these, the CC compounds 224 and 640 [31, p. 181] (2 oz. per bush.), panogen S (1 fl.oz.), arasan-spergon mixture (0·75–1·5 oz.), and arasan SF slurry (1·5 oz.) were the most effective. CC 224 gave the most consistent yield increases, i.e., in seven out of 10 plantings, though it increased the field stand no more than 50 per cent. over that obtained in laboratory seed germination tests. It was more effective as a dust than slurry. The addition of arasan, CC 640, and CC 224 to the soil at sowing time gave no increase in the yield from treated seed, the last-named reducing it.

Batchelor (L. D.) & Bitters (W. P.). **High quality Citrus rootstock.**—*Calif. Agric.*, 6, 9, pp. 3–4, 4 figs., 1952.

Work in the experimental orchard of the University of California College of Agriculture, Riverside, has shown that Cleopatra mandarin and Troyer citrange (navel orange × trifoliate orange [*Poncirus trifoliata*]) are promising rootstocks for orange trees [*R.A.M.*, 32, p. 621]. The trees on Cleopatra mandarin stock produced oranges, grapefruit, and lemons of as good a quality as trees on sweet or sour orange roots, and far superior to those on rough lemon. Cleopatra mandarin possesses a proved tolerance of quick decline virus [loc. cit. and next abstract] and a high resistance to gummosis [*Phytophthora* spp.: loc. cit.].

Bitters (W. P.) & Parker (E. R.). **Quick decline studies.**—*Calif. Agric.*, 6, 3, pp. 7, 15, 4 figs., 1952.

Experiments were carried out in two localities in California to salvage orchard citrus trees susceptible to quick decline [see preceding abstract]. Both top-working and inarching induced recovery. Normal growth was observed in 28 Valencia sweet orange trees entirely top-worked with Eureka lemon in the Glendora area, while those partially top-worked did not recover well and some collapsed and died. This was attributed to the presence of diseased sweet orange top on a part of the tree, but once it was removed lemon scions grew normally again. Inarching experiments in the Azusa–Covina area proved to be less practical than replanting with tolerant combinations. Rough lemon inarches, however, grew more rapidly than sweet orange ones, and had beneficial effects on the trees but adverse effect upon yields of older trees. In general, tree response was better when the inarches grew well, but this was influenced by the severity of quick decline symptoms.

It is advisable to perform some girdling in the area of inarch insertion and to prune affected trees at or soon after inarching.

Bitters (W. P.). **Exocortis disease of Citrus.**—*Calif. Agric.*, 6, 11, pp. 5–6, 1952.

The citrus root disease exocortis [*R.A.M.*, 31, p. 382] is present in most areas of California where *Poncirus trifoliata* is used as a rootstock. Trees on this stock vary considerably in size, partly because of this disease. The most striking symptom is the scaling of the trifoliate bark, which results in stunting of the top growth. The trees are seldom killed but become useless.

From an investigation of genetic factors in relation to the problem it appears possible that the progeny of trees suffering from the disease may possess a weakness predisposing them to it. None of the eight *P. trifoliata* hybrid combinations budded on sour or sweet orange, or Sampson tangelo showed any sign of exocortis. It seems probable that the disease is of a virus nature. Experiments are in progress at the

University of California College of Agriculture, Riverside, California, to investigate it further.

Suit (R. F.) & DuCharme (E. P.). **Parasitic nematodes in relation to spreading decline of Citrus.**—*Calif. Citrogr.*, 38, 9, pp. 307, 319–322, 1 fig., 1953.

Recent investigations revealed that spreading decline of citrus in Florida [cf. *R.A.M.*, 32, p. 676] is caused by infestation of the feeder roots by the burrowing nematode (*Radolphus similis*).

Childs (J. F. L.). **An actinomycete associated with gummosis disease of Grapefruit trees.**—*Phytopathology*, 43, 2, pp. 101–103, 1 fig., 1953.

An actinomycete has been found regularly in gum pockets on grapefruit trees affected by a gummosis disease in Florida. Masses of gall tissue with channels of liquid gum develop, the whole being more or less deeply buried in the xylem [cf. *R.A.M.*, 24, p. 447]. Since 1950 the organism has been isolated on glucose asparagine agar and other media, on all of which growth is extremely slow. Inoculation experiments on grapefruit trunks and branches resulted in the development of typical gummosis symptoms. The author has already pointed out (*Proc. Fla hort. Soc.*, pp. 32–36, 1950) that the symptoms of Rio Grande gummosis in Texas [*R.A.M.*, 24, p. 446; 31, p. 237] do not differ from those of the Florida form of the disease.

Prew (H. A.). **Collar rot and brown rot of Citrus.**—*N.Z. J. Agric.*, 86, 5, pp. 457–460, 4 figs., 1953.

Semi-popular notes are given on the symptoms and control of citrus collar rot and brown rot (*Phytophthora* spp.), both prevalent in the citrus-growing areas of New Zealand [*R.A.M.*, 19, p. 645; 22, p. 132; 26, p. 330]. The former is a major factor in limiting citrus production; the latter, though sometimes very destructive, does not attack the trees every season and is readily controlled. Island Seedling sweet orange, the main rootstock used in New Zealand, and rough lemon possess some resistance to collar rot.

Childs (J. F. L.). **Concentric canker and wood rot of Citrus associated with Fomes applanatus in Florida.**—*Phytopathology*, 43, 2, pp. 99–100, 1 fig., 1953.

A form of wood rot [cf. *R.A.M.*, 31, p. 181] herein designated concentric canker is fairly prevalent in Florida on old grapefruit, sweet orange, and Dancy tangerine trees. In a 50-year-old Duncan grapefruit orchard 19 per cent. of the trees were affected by the canker and a further 20 per cent. by wood rot without bark symptoms. In general, the concentric cankers indicative of wood rot are lenticular in outline, the long axis being parallel with the trunk or branch axis. The bark is ruptured by more or less concentric fissures, probably representing previous margins of the canker. A dead stub or a wound is usually present in the centre of the cankered area where, probably, infection originated. Within the cankered area the dead bark tends to be shaggy or scaly.

Portions of very decayed wood are of a 'punky' consistency, but those more recently invaded are normally firm and of a tan to brown colour. The part near the bark seems to be as much affected as the older, more central wood, suggesting (in conjunction with the destruction of the bark) that the causal organism is a true pathogen of citrus. The sporophores commonly but not invariably associated with the disease are provisionally referred to *Fomes applanatus* [*Ganoderma applanatum*: cf. 15, p. 16]. Their context is deep reddish-brown with a cream or white margin, and they mostly measure 3 to 6 in. across the widest portion, the largest found being 16 in. A few resupinate specimens were observed.

The control of wood rot and concentric canker, which are believed to be of considerable importance in the general deterioration of Florida citrus orchards, is largely a matter of prevention by rational pruning practice. Dead or broken branches should be cut off flush and all wounds disinfected, preferably with Avenarius or Red Arrow carbolineum, and then painted over with a water-repellent dressing, e.g., of asphalt emulsion. Early infections can be excised and treated in the same way as natural wounds.

Reuther (W.) & Smith (P. F.). **Iron chlorosis in Florida Citrus groves in relation to certain soil constituents.**—*Proc. Fla hort. Soc.*, 65, pp. 62–69, 7 figs., [? 1952].

Most mature Florida citrus groves have accumulated relatively high concentrations of copper, manganese, and phosphorus in the top-soil. Pot and nutrient solution experiments have shown that copper is many times more potent in producing iron chlorosis of the foliage [*R.A.M.*, 29, p. 24] and toxic effects on the roots than either zinc or manganese. Soil copper levels required to produce these responses are within the range found in most groves affected with iron chlorosis. Low soil pH probably aggravates copper toxicity by increasing availability. It therefore appears advisable to discontinue the practice of applying copper oxide to bearing groves in Florida, and to control soil pH by regular applications of lime.

Petrushova (Mme N. I.) & Kudryashova (Mme L. S.). Борьба с заболеванием сеянцев Цитрусовых культур черной ножкой. [Control of black leg disease of Citrus nursery seedlings.]—Сад и Огород [*Orchard & Garden*], *1952*, 4, pp. 23–24, 1 fig., 1952.

Field and laboratory studies at the Molotov Botanical Garden, Nikitsky, U.S.S.R., have shown that citrus 'black leg', a disease of young citrus seedlings in Crimea, is caused by species of *Rhizoctonia*, *Pythium*, and *Fusarium*, the first being the most aggressive of the three. Symptoms characteristic of each fungus differ a little from one another. Leaves of the plants infected with *Rhizoctonia* wilt slightly, the collar becomes brown and thin, and the stem is infected 2 to 3 cm. above the ground, having a white, cobweb-like layer on the affected parts. *Pythium* sp. causes the collar region to turn yellow; the plant softens and succumbs. The stem is affected up to 1 cm. above the ground. *Fusarium* infection starts from the collar; the seedlings turn yellow and dry but do not die, and in damp air pink fructifications develop. The disease sometimes causes up to 60 to 70 per cent. deaths. On 10- to 30-year-old seedlings affected with 'black leg' bands develop at the collar, which in wet weather becomes covered by a white felt. The stems become brown and thinner at the base, the roots rot, and the seedlings wilt and die.

Experiments have shown that infection can penetrate, not only through injured, but also through quite sound tissues. A solution of formalin (0·5 per cent.) applied to the soil killed all three pathogens. Satisfactory control of *Pythium* and *Fusarium* was also obtained with a 5 per cent. copper compound, which, however, was not sufficiently effective against *Rhizoctonia*.

Duffield (P. C.), Ortega C[antero] (B.), & Carrillo A. (F). **Enfermedades del Algodonero en la Comarca Lagunera, México.** [Cotton diseases in the Comarca Lagunera, Mexico.]—*Foll. Divulg. Secret. Agric. Méx.* 12, 42 pp., 7 figs., 1 graph, 1953. [English summary.]

During the past decade the high price of cotton has resulted in the almost exclusive cultivation of this crop in the Comarca Lagunera, an important agricultural zone of northern Mexico, where three serious soil-borne diseases have consequently developed, namely, damping-off (*Rhizoctonia* sp.), *Verticillium* wilt (*V. albo-atrum*), and Texas root rot (*Phymatotrichum omnivorum*) [C.M.I. map No. 15].

The first probably causes the heaviest damage, though either of the other two may suddenly change a potentially high yield to a grave economic failure. Prior to 1946 the flood waters of the Nazas River basin were the main source of irrigation water for two-thirds of the land, which was usually fallowed and flooded to a depth of 3 to 4 ft. one year, and the crop taken the following year depended upon the reserve soil moisture and whatever rains might occur. This system probably prevented the build-up of the diseases, whereas with the new Presa Lazaro Cardenas dam the irrigation is controlled and farmers tend to plant cotton every year. Crop rotation and soil amendment with organic matter greatly reduced all three diseases.

Arndt (C. H.). **Evaluation of fungicides as protectants of Cotton seedlings from infection by Rhizoctonia solani.**—*Plant Dis. Reptr*, 37, 7, pp. 397–400, 2 figs., 1953. [Multilithed.]

A new sand-culture technique for evaluating chemicals as seed and seedling protectants [cf. *R.A.M.*, 28, p. 286], in this case against *Rhizoctonia* [*Corticium*] *solani* on cotton [32, p. 624], was developed at the South Carolina Agricultural Experiment Station, Clemson. Steamed sand in a circular dish was moistened with nutrient solution, stirred, and levelled, and 32 holes, 12 mm. in diameter and 30 mm. deep, arranged in three rings, were punched in the upper layer. One acid-delinted cotton seed was placed in each hole of the two outer rings together with a mixture of sand and fungicide. In each of the four holes of the central ring was dropped one barley seed inoculated with the fungus.

Dowicide F [22, p. 413] (at one part active chemical in 80,000), seedox [28, p. 286] (1:20,000), and 275-D [31, p. 181] (1:20,000) gave significant protection from *C. solani*, i.e., 50, 61, and 68 healthy cotton seedlings, respectively, per 84 seeds sown after a 12-day culture period at 24° C., compared with 78 in the uninoculated series without fungicide, and none in the inoculated.

Michelbacher (A. E.) & Middlekauff (W. W.). **Fungus on Codling Moth.**—*Calif. Agric.*, 6, 3, p. 13, 1 fig., 1952.

Most of this information on the disease of overwintering larvae of the codling moth (*Carpocapsa* [*Cydia*] *pomonella*) in walnut orchards in California, caused by a fungus closely related to *Beauveria bassiana*, has already been noticed from another source [*R.A.M.*, 30, p. 368].

Buston (H. W.), Jabbar (A.), & Etheridge (D. E.). **The influence of hexose phosphates, calcium and Jute extract on the formation of perithecia by Chaetomium globosum.**—*J. gen. Microbiol.*, 8, 12, pp. 302–306, 1953.

In the Department of Botany, Imperial College of Science and Technology, London, chromatographic examination of an aqueous extract of jute revealed the presence of inorganic phosphate, glucose-6-phosphate, fructose-1:6-diphosphate, and calcium ions. A mixture of the last three in the amounts estimated to be present in jute extract stimulated early and vigorous perithecial formation by *Chaetomium globosum* (Basu 79) in the same manner as the extract [*R.A.M.*, 32, p. 142], though the amount of vegetative growth was appreciably less. There was no indication of a specific 'fruiting factor'.

Baker (K. F.). **Recent epidemics of downy mildew of Rose.**—*Plant Dis. Reptr*, 37, 6, pp. 331–339, 1953. [Multilithed.]

Because the occurrence of rose downy mildew (*Peronospora sparsa*) [*R.A.M.*, 31, p. 608] is highly sporadic its potential importance is frequently under-estimated. This paper deals briefly with the history and distribution of the disease, predisposing environmental conditions, particularly in relation to recent epidemics in the

United States [loc. cit.], and recommended control measures. There is a bibliography of 57 titles.

Emsweller (S. L.), McClellan (W. D.), & Smith (F. L.). **Roses for the home.**—*Home Gdn Bull.* 25, 38 pp., 27 figs., 1953.

This bulletin on the classification, culture, propagation, and disease control of garden roses [*R.A.M.*, 30, p. 370] supersedes *Fmrs' Bull. U.S. Dep. Agric.* 750. In the well-illustrated section on diseases (pp. 24–30) black spot [*Diplocarpon rosae*: *R.A.M.*, 32, p. 482] is stated to be the most serious and prevalent; control is effected by spraying or dusting with sulphur, sulphur lead arsenate, or ferbam [32, p. 254]. These sprays also control powdery mildew [*Sphaerotheca* spp.: 32, p. 558] and rust [*Phragmidium* spp.].

Jenkins (Anna E.) & Bitancourt (A. A.). **Identifição de Cryptosporella umbrina em Roseira, em São Paulo.** [Identification of *Cryptosporella umbrina* on Rose in São Paulo.]—*Biológico*, 19, 2, pp. 34–36, 2 figs., 1953.

Cryptosporella umbrina was recently observed, apparently for the first time in South America, on hybrid tea roses [*R.A.M.*, 29, p. 466] of the Elite and Erick Hjalm varieties in a nursery near São Paulo, Brazil. The identity of the pathogen, both the perfect and imperfect states of which were represented, was confirmed by laboratory studies and inoculation experiments.

Moreau (Mireille). **La fusariose de l'Œillet dans la région parisienne.** [Fusariosis of Carnation in the Paris area.]—*Rev. hort., Paris*, 125, 2195, pp. 930–932, 6 figs., 1953.

After noting the heavy losses caused by and the symptoms of fusariosis disease of hothouse carnations in the vicinity of Paris [*R.A.M.*, 32, p. 562] the author expresses the view that *Fusarium dianthi* [see above, p. 17] is usually only of secondary importance in the causation of this disease, the most active pathogens being members of the *F.* '*roseum*' group. Among these last, *F. avenaceum* and *F. scirpi* appear to be of equal pathogenicity. Even apparently healthy cuttings may be infected [30, p. 568]. The fungus may live on from one season to the next in soil adhering to pots. A hothouse atmosphere provides a permanent source of infection, containing numerous *Fusarium* spores even after fumigation with sulphur. Penetration of the host appears to occur directly when humidity and temperature conditions strongly favour infection, but it generally takes place through wounds, especially after picking. Transmission is by insects and water.

Control may be achieved by improved cultural methods, disinfection of cuttings, and fungicidal spraying at each new potting and during flowering. The best results with cuttings were obtained by 15 minutes' immersion in sapractyl A 3 (0·05 per cent. solution of a glycolic ester of dichlorocresol), the same material also being useful for spraying. In severe outbreaks this treatment should be applied every three weeks; it is harmless to the flowers, very active against *Fusarium*, and appears to have some controlling effect on *Uromyces caryophyllinus* [*U. dianthi*]. Application of lanoline containing a disinfectant to cutting and other wounds gave good results. After each growth cycle the air in the glasshouse should be fumigated and used flowerpots disinfected.

Srivastava (S. N. S.). **On the occurrence of Phoma chrysanthemicola Hollos on Chrysanthemum sp.**—*Curr. Sci.*, 22, 7, p. 216, 1953.

Phoma chrysanthemicola (*Ann. hist.-nat. Mus. hung.*, 5, p. 456, 1907) was detected on chrysanthemum seedlings of several varieties imported from Holland and grown under quarantine conditions at the laboratory of the Plant Quarantine Station,

Poona, India. Necrosis of the stems and root rot was followed by death, succeeded four or five weeks later by the development of pycnidia of the fungus on the dead stalks. They measured 138 to 207 by 110 to 138 μ, the spores being 5 to 6 by 1·75 to 2 μ.

Importation of Antirrhinums.—*Tasm. J. Agric.*, 24, 2, p. 160, 1953.

It is considered that antirrhinum rust [*Puccinia antirrhini*: *R.A.M.*, 32, p. 316] if introduced into Tasmania would completely eliminate antirrhinum cultivation on the island. A Proclamation prohibiting the importation from New South Wales of any antirrhinum plants or cut flowers was, therefore, issued under the Plant Diseases Act (1930). Seeds may only be imported if examined and approved by the Department of Agriculture, Hobart. It is suggested that seed treatment with fungicides should be applied before release to the importer.

Bald (J. G.). **Neck rot phase of the Botrytis disease of Gladiolus.**—*Phytopathology*, 43, 4, pp. 167–171, 1 fig., 1953.

In southern California the 'aggressive' persistent neck rot lesions produced by *Botrytis gladiolorum* on gladiolus [*R.A.M.*, 31, p. 490] develop mainly from infective material carried on the corms or from air-borne spores. During 24 or 48 hours of favourable weather, combining continuous high humidity with temperatures ranging from 55° to 65° F., single lesions may give rise to approximately 1,000,000 spores. These are the conditions that promote the leaf spot phase of the disease, but for neck rot they occur at and below rather than above soil-level.

The results of histological studies indicated that the mechanisms enabling the host tissues to limit invasion by the mycelium of *B. gladiolorum* include the formation of gum in the leaves and of periderm in the corms. The efficiency of such defensive reactions appears to be related to temperature [28, p. 389]. No such reaction was observed in petals.

Harrison (I. R.). **Pediculopsis sp.—A mite found on Acidanthera and Gladiolus corms.**—*Plant Path.*, 1, 4, pp. 119–120, 1 pl., 1952.

In January, 1952, at the Plant Pathology Laboratory, Harpenden, Herts., a large number of mites, probably belonging to a new species of *Pediculopsis*, was found in three of six separate consignments of *Acidanthera* corms from Holland affected by rot due to *Botrytis gladiolorum* [cf. preceding abstract]; later, a single gladiolus corm with the core phase of the rot was also found to be infested. Experimental evidence indicated that the mite is unable to establish itself in large, actively reproducing colonies except in the presence of the fungus. The mites distribute spores of *B. gladiolorum*, but there was no evidence from these experiments that the mite is capable of carrying infection to healthy corms when feeding.

Pesante (A.). **Segnalazione di una ruggine nuova della Statice (Statice sinuata L.).** [Report of a new rust on *Statice* (*Statice sinuata* L.).]—*Nuovo G. bot. ital.*, N.S., 59, 2–4, pp. 561–564, 2 figs., 1952. [Received October, 1953.]

Limonium sinuatum var. *atrocoeruleum* plants growing at San Remo, Italy, were attacked by a rust. Both surfaces of the leaves were affected and the stems were thickened, bent, dark violet, and, because of the presence of numerous pustules very close together, superficially rough. Swellings sometimes caused deformation or abortion of the inflorescence, which was replaced by a gall.

There were also yellow-brown pycnidia in the mesophyll and acervuli in the stem. The latter measured from under 100 to over 1,500 μ in diameter and produced single, spheroidal conidia 8 to 12 μ in diameter and with a thin, smooth wall. The double infection probably represented an association, in the stem, between the rust

and a species of *Tuberculina*. Only two rusts have been recorded on the genus *Statice* [*Limonium*], *Uromyces armeriae* and *U. limonii* [see next abstract], but the author's rust, in which the wall of the teleutospore and its pedicel are hyaline, evidently does not belong to this genus. The investigation is to be continued.

Servazzi (O.). **Su una ruggine di Statice latifolia Sm.** [On a rust of *Statice latifolia* Sm.]—*Nuovo G. bot. ital.*, N.S., 59, 2–4, pp. 576–577, 1952. [Received October, 1953.]

In May, 1950, the author received from Turin leaves of *Statice latifolia* [*Limonium latifolium*] bearing numerous aecidia of *Uromyces limonii* [cf. *R.A.M.*, 30, p. 585 and preceding abstract].

Servazzi (O.). **Botrytis paeoniae Oud., nuova entità della micoflora italiana.** [*Botrytis paeoniae* Oud., a new member of the Italian mycoflora.]—*Nuovo G. bot. ital.*, N.S., 59, 2–4, pp. 573–575, 1 fig., 1952. [Received October, 1953.]

In May, 1951, the leaves of peonies (*Paeonia arborea*) growing at Villanova d'Asti were affected by *Botrytis paeoniae* [cf. *R.A.M.*, 6, p. 668; 31, p. 492, *et passim*], not previously recorded in Italy.

Tokushige (Y.). **Overwintering of Oidium euonymi-japonicae.**—*Ann. phytopath. Soc. Japan*, 17, 2, pp. 61–64, 3 figs., 1 graph, 1953. [Japanese, with English summary.]

Uncinula (*Oidium*) *euonymi-japonicae*, which does not appear to produce perithecia, overwinters on *Euonymus japonica* in Japan [*R.A.M.*, 8, p. 579] as a superficial mycelium with haustoria on the lesions on the previous year's leaves.

Howard (F. L.) & Davies (M. E.). **Curvularia 'fading-out' of turf grasses.**—Abs. in *Phytopathology*, 43, 2, p. 109, 1953.

Since 1949 the velvet bent (*Agrostis canina*) plots at Rhode Island Agricultural Experiment Station have intermittently developed a dappled yellow and green pattern which consistently yielded *Curvularia lunata* [*R.A.M.*, 31, p. 330]. In severe cases the turf fades out, leaving ill-defined dead patches, usually 2 to 3 in. wide. In 1952 there were at least three epiphytotic outbreaks of the disease at the Station, and samples infected by the same fungus were also received from Massachusetts, Connecticut, New York, New Jersey, and Missouri. Typical symptoms were observed on 80 and 40 per cent. of Piper and B-16 plants, respectively, as well as on smaller numbers of other varieties of *A. canina*, creeping bents (*A. palustris*), and annual bluegrass (*Poa pratensis*). Satisfactory control was obtained in both the 1949 and 1952 tests by spraying with phenyl mercury acetate (1 oz. 10 per cent. active chemical in 10 gals. water per 1,000 sq. ft.), while actidione [32, p. 629] and a water-soluble cadmium formulation (cadsol) were also effective in the latter year.

Shurtleff (M. C.). **Susceptibility of lawn grasses to brown patch.**—Abs. in *Phytopathology*, 43, 2, p. 110, 1953.

In tests [at an American experiment station] to determine the reactions of 21 grass varieties to 29 isolates of the brown patch fungus (*Rhizoctonia* [*Corticium*] *solani*), including six from turf [*R.A.M.*, 32, p. 192], one-month-old plants were inoculated with eight-day-old shake cultures on a modified Czapek's medium and then incubated at 75° to 85° F. and high humidity for 48 hours. Using a scale in which 0 represents no disease and 11 is equivalent to 100 per cent., the ratings were as follows: Rhode Island colonial bent [*Agrostis tenuis*] 8·8, Highland colonial 8·6, B-11 velvet bent [*A. canina*] 8·5, Astoria colonial 8·2, Seaside creeping bent [*A. palustris*] and meadow fescue [*Festuca elatior*] 7·6, red top [*A. alba*] 7·4, Merion

bluegrass [*Poa pratensis*] 7·3, Canada bluegrass [*P. compressa*] 7·2, perennial rye grass [*Lolium perenne*], Italian rye grass [*L. multiflorum*], and Alta meadow fescue 7·1, annual bluegrass [*P. annua*] 6·6, Illahee fescue [*F. rubra*] 6·1, Trinity fescue [*F.* sp.] and Ladino clover 5·8, creeping red fescue [*F. rubra*] 5·7, rough bluegrass [*P. trivialis*] 5·2, Thorne wheat 3·6, and Penn. No. 603 maize 3·3.

Meiners (J. P.) & Fischer (G. W.). **Further studies on host specialization in the head smut of grasses, Ustilago bullata.**—*Phytopathology*, 43, 4, pp. 200–203, 1953.

Further studies at the State College of Washington on physiologic specialization in *Ustilago bullata* [*R.A.M.*, 31, p. 493] resulted in the identification of four new races, 9, 10, 11, and 12, and a reduction in the number of differential hosts from 14 to 11 [20, p. 347]. Variation in the reaction of differential grass species, irrespective of purity of inoculum, was demonstrated in experiments with both paired monosporidial lines and spores. The race descriptions have accordingly been modified to allow for such variability.

Prasada (R.). **Results on wild grasses.**—*Curr. Sci.*, 20, 9, p. 243, 1951.

This is a recapitulation of information on the pathogenicity of wheat black rust (*Puccinia graminis*) [*R.A.M.*, 32, p. 545] to grasses growing at the Indian Agricultural Research Institute, New Delhi. The importance of testing imported grasses with Indian races of the rust prior to their general release is stressed.

Kulkarni (U. K.). **On the production of two-celled basidia in Puccinia penniseti Zimmerm.**—*Sci. & Cult.*, 19, 1, pp. 39–40, 1 fig., 1953.

In studies at the Maharashtra Association for the Cultivation of Science, Poona, on the cytology of *Puccinia penniseti*, common in many parts of the Bombay State on *Pennisetum typhoideum* [*R.A.M.*, 29, p. 148], some unusual features in the life history were observed, including the constant production of two-celled basidia [cf. *Mycologia*, 27, pp. 553–572, 1935] and quadrinucleate basidiospores.

Seethalakshmi (V.) & Ramakrishnan (T. S.). **Phytophthora cyperi-bulbosi, sp. nov. on Cyperus bulbosus Vahl.**—*Curr. Sci.*, 22, 5, pp. 149–150, 4 figs., 1953.

A description is given of *Phytophthora cyperi-bulbosi* n.sp. which caused blight and withering of the leaves and leaf sheaths of *Cyperus bulbosus* at Coimbatore, India, in October, 1952. Attempts to grow the fungus on agar media were unsuccessful. In inoculation experiments sporangia produced typical lesions on the leaves of *C. bulbosus* in three days. The fungus is characterized by its obpyriform sporangia, with a broad papilla, 23 to 50 by 20 to 34 μ, tuberculate oogonia 31 to 53 (average 40) μ in diameter, and oospores almost filling the oogonium, brown, 25 to 42 (33) μ in diameter, with paragynous antheridia, 16 by 12 μ.

Singh (R. S.). **A leaf blight of Guar.**—*Sci. & Cult.*, 19, 3, pp. 155–156, 1953.

Severe blighting and rotting of the leaves, petioles, and young branches of guar [*Cyamopsis tetragonoloba*] by *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 31, p. 386] is common during drizzling weather with high temperature at Kanpur, India. The disease is most severe in August and appears on freshly emerged seedlings under waterlogged conditions as small, circular to irregular, pale, watersoaked spots on the thick cotyledons. The lesions develop and spread very rapidly when the accumulated water has receded, soon leading to complete rotting of the leaves and petioles, particularly in persistently humid weather.

Isolates of *C. solani* from rotting leaves and from the roots of plants killed by root rot both caused root rot and leaf blight of guar to the same extent.

Patel (M. K.), Dhande (G. W.), & Kulkarni (Y. S.). **Bacterial leaf-spot of Cyamopsis tetragonoloba (L.) Taub.**—*Curr. Sci.*, 22, 6, p. 183, 1953.

A description is given of *Xanthomonas cyamopsidis* n.sp. on *Cyamopsis tetragonoloba* at Patna, Bihar, and Khopoli, Bombay, India, in 1952. The disease is characterized by small, circular, watersoaked spots all over the lamina, olive-coloured on the upper surface and oily in appearance on the under surface. In later stages the spots become jet black and when numerous coalesce, forming irregular lesions surrounded by chlorotic areas. The pathogen forms capsulated rods singly or in chains of two, motile with one flagellum, 1·5 by 0·8 μ, hydrolysing starch and casein, reducing litmus, not producing nitrites from peptone and potassium nitrate, forming hydrogen sulphide and ammonia, with an optimum temperature of 25° to 31° C., a thermal death point of 52°, and no growth at 5° to 13°; on nutrient agar the colonies are flat, smooth, glistening with lobate margins, mustard yellow in colour, reaching 1·1 cm. after six days.

Vernal Alfalfa, new hardy variety.—*Seed World*, 73, 4, p. 8, 1 fig., 1953.

Vernal, a new winter-hardy lucerne variety resistant to bacterial wilt [*Corynebacterium insidiosum: R.A.M.*, 32, p. 680] and leaf spot [*Pseudopeziza medicaginis*: loc. cit.], has been developed at the Wisconsin Station. In tests over three years in Wisconsin, New York, Pennsylvania, and Canada it compared favourably in yield with other varieties. It is hoped that the seed will be generally released by the autumn of 1956.

Tenney (W. R.). **The nature of seed transmission in blackpatch of Red Clover.**—*Proc. W. Va Acad. Sci.*, 24, pp. 68–71, 3 figs., 1952. [Received October, 1953.]

Anatomical studies at West Virginia University showed the causal fungus of the black patch disease of red clover, which has an unidentified sterile mycelium [*R.A.M.*, 31, p. 286], to be present both on the surface of seeds from infected fields and within the embryonic tissues of these seeds. On germination, the mycelium grows into the hypocotyl and usually causes the death of the seedling.

Black (J. D. F.). **Prevent fruit diseases by timely spraying.**—*J. Dep. Agric. Vict.*, 51, 9, pp. 427–428, 1 fig., 1953.

Phenyl mercuric chloride, phenyl mercuric fixtan, thiram, and ziram used for cover sprays were equal to lime-sulphur in their control of apple black spot [*Venturia inaequalis: R.A.M.*, 32, p. 24] in Victoria in 1952–3, but they possess the disadvantages of causing leaf mottle and having no insecticidal value. The varieties Yates and Delicious suffered the most leaf mottle but Granny Smith, Rokewood, and Ballarat were also affected. Fruit damage occurred occasionally where a mercury spray had been mixed with lead arsenate. The new materials gave similar results in the control of pear black spot [*V. pirina*: loc. cit.] but leaf mottling was far more marked. Josephine and Winter Cole were severely affected, Packham and Winter Nelis less so. Josephines are also subject to a fruit thinning effect. The Department now recommends 0·125 per cent. thiram or ziram for post-blossom cover sprays on Josephine and Winter Cole [loc. cit.] and for application between the early green tip Bordeaux and petal fall sprays.

Apricot freckle [*Cladosporium carpophilum*: 23, p. 475] has become increasingly prevalent in the Werribee and Wandin areas during the past few years and it is very difficult to control because of the extreme susceptibility of the fruit to spray damage. So far thiram and ziram have caused no economic damage to apricots and have given promising control of both freckle and shot hole [*Clasterosporium*

carpophilum: 32, p. 681]. They should be applied at the rate of 1½ lb. in 100 gals. water plus ½ gal. white oil at 'shuck' fall and again a month later.

Atkinson (J. D.) & Bollard (E. G.). **Note on manganese deficiency in Apple, Plum, and Quince.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 1, pp. 19–21, 3 figs., 1953.

Manganese deficiency is present occasionally in the Auckland, Hastings, and Central Otago areas of New Zealand [cf. *R.A.M.*, 32, p. 571] on apples [cf. 26, p. 112; 32, p. 632], in the last two districts on plums [cf. 30, p. 166], and in Auckland and Hawke's Bay on quince. Under local conditions the disorder on apple and plum trees is characterized by a small percentage of leaves which display either a pale chlorotic marginal band or a more extensive yellowing involving both interveinal and marginal areas. In a few leaves only the veins remain green, but there is no marked reduction in tree growth. On quince interveinal chlorosis, sometimes extending over three-quarters of the leaf, is quite common. Some leaves turn nearly completely yellow with only a narrow green strip along the main veins. Usually, chlorosis is most severe in the first formed leaves.

Effective control is obtained with an annual spray of manganese sulphate (5 lb.) plus hydrated lime (4 lb. in 100 gals.), applied just after fruit set.

Chamberlain (E. E.), Atkinson (J. D.), & Hunter (J. A.). **Note on the systemic nature of Apple-mosaic virus in Apple trees.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 6, pp. 551–552, 1953.

Studies on apple mosaic virus in New Zealand [*R.A.M.*, 30, p. 20] have shown that it is systemic in infected trees, is widespread, and incidence is high, particularly in Jonathan and Delicious. Symptoms were induced in scion or stock or both with buds taken from symptomless branches.

Mulder (D.). **De proliferatieziekte van Appel, een virusziekte.** [The proliferation disease of Apple, a virus disease.]—*Tijdschr. PlZiekt.*, 59, 2, pp. 72–76, 2 figs., 1953. [English summary.]

Distinctive features of a graft-transmissible virus affecting the Golden Pippin, Beauty of Boskoop, and other apple varieties in Holland are excessive proliferation of the water shoots and abnormal enlargement of the stipules. The trouble, herein designated 'proliferation disease', is believed to be identical with witches' broom of the same host reported from Italy [*R.A.M.*, 32, p. 681] and also present in Switzerland, according to a verbal communication from [H.] Fritsche.

Het schurftonderzoek in 1952 (I), (II). Samengesteld door de schurftonderzoekers in Nederland. [The scab investigation in 1952 (I), (II). Compiled by the scab-investigators in Holland.]—*Meded. Dir. Tuinb.*, 16, 3, pp. 184–213; 5, pp. 300–318, 4 figs., 11 graphs, 1953. [English summaries.]

This is a comprehensive survey, prepared by D. Mulder, E. J. Keijer, H. P. Dijksterhuis, A. F. H. Besemer, C. A. R. Meijneke, P. J. H. Jongejan, P. Hus, and J. G. Ten Houten, of experiments performed in different parts of Holland in 1952 to determine the practicability of the cure (as opposed to the prevention) of apple scab (*Venturia inaequalis*) [see above, p. 14] by organic mercurials, e.g., aaventa [loc. cit.], which was also tested in 1951, at a concentration of 0·15 per cent. for the first spray, 0·1 per cent. for subsequent pre-blossom treatments, and 0·07 per cent. after flowering. Excellent results were uniformly secured by spraying within four to five days after infection. The data collected by American workers on the interrelations of temperature, the duration of moisture on the leaves, and the incidence of infection proved to be applicable to the determination of infection dates and incubation periods in Holland [cf. *R.A.M.*, 27, p. 426].

Gorinova (Mme Y. V.). Способ борьбы с паршой Яблони. [A method of controlling Apple scab.]—Сад и Огород [*Orchard & Garden*], *1953*, 5, p. 77, 1953.

At the Pan-Soviet Scientific Research Institute of Plant Protection, U.S.S.R., from 1950 to 1952 apple scab [*Venturia inaequalis: R.A.M.*, 32, p. 133] was controlled by spraying fallen leaves with 0·5 per cent. selinon or 2 per cent. preparation 47 and the trees with copper sulphate followed by two or three supplementary sprays with Bordeaux mixture in early spring when the perithecia were ripe. Leaf and fruit infection, respectively, were reduced 2·5 and 7 to 10 times on severely affected Reinette Simirenko and Paper Reinette varieties.

Stanton (W. R.). **Field variation in Venturia pirina.**—*Trans. Brit. mycol. Soc.*, 36, 2, pp. 90–103, 1 pl., 2 diags., 3 graphs, 1953.

Variation in 80 isolates of the pear scab fungus, *Venturia pirina*, collected from various parts of England on various pear varieties was studied in culture [*R.A.M.*, 29, p. 417] at the John Innes Horticultural Institution, Bayfordbury, Herts. The morphological differences between the isolates were too great to allow a detailed analysis. The morphology is affected greatly by the medium, and as malt agar was found to be very variable most of the culturing was done on Dox agar with or without 0·25 per cent. Difco yeast extract. Heritable differences, as determined by serial ascospore isolations, were found in mycelial growth, form, and colour (which varied from ivory to brown or grey), and in thiamine requirement. The only significant differences in spore size were between clones and media.

There were no significant geographical or varietal correlations; isolates differing widely in morphology or nutritional requirements were obtained from a single host plant. A population of about 5,000 isolates would probably be required before the presence of geographical differences could be detected. However, the samples used in these experiments demonstrated the similarity of English variants of *V. pirina* to those in Germany [32, p. 196] and the United States and also to strains of *V. inaequalis*.

Bollard (E. G.). **Zinc deficiency in Pears.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 6, pp. 548–550, 1 fig., 1953.

Severe zinc deficiency in pear trees [*R.A.M.*, 30, p. 328; 31, p. 494] is reported from Central Otago, New Zealand. A summer spray followed by an autumn or winter spray with zinc sulphate (3 lb.) plus hydrated lime (4 lb.) in 50 gals. water restored normal growth. The zinc content of deficient pear leaves was 9·9 p.p.m., compared with 16 p.p.m. for healthy.

Bollard (E. G.). **Note on internal-browning of Quince fruits.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 1, pp. 63–64, 2 figs., 1953.

The results of spray applications from 1949 to 1951, inclusive, in the Auckland district, New Zealand, suggest that internal browning of quince fruits (variety Smyrna), the cause of which is still unknown, is probably not due to a deficiency of a common trace element. Early picking of the fruit followed by early utilization may reduce losses from this disorder.

Willison (R. S.) & Weintraub (M.). **Studies on stone-fruit viruses in cucurbit hosts. I. A method of evaluating the infectivity of infectious juice.**—*Phytopathology*, 43, 4, pp. 175–177, 3 graphs, 1953.

The authors describe a quantitative method of assay by infection rating which is used at the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario, Canada, in studies on the properties of stone fruit viruses [*R.A.M.*, 32, p. 135] affecting cucurbits [28, p. 233; 31, p. 421]. Since no suitable local lesion host is

known for these viruses the infection rating is the average degree of severity of the disease induced in a number of plants of uniform age inoculated simultaneously with the same inoculum. It is obtained by assigning values to the phases of symptom expression and averaging the resulting scores for individual assay plants in replicate with a given inoculum. Using isolates G.1 and Y.1 from two cherry trees showing symptoms of green ring mottle and cherry yellows, respectively, N.1 from Lombard plum with latent necrotic ring spot, and T.2 from sweet cherry with tatter leaf, examples are given of the application of the method to the comparison of isolates, the effect of conditions of assay on host reaction to the same or different isolates, and the determination of changes in the levels of effective virus concentrations with dilution.

Dye (D. W.). **A die-back of stone-fruit trees.**—*Orchard. N.Z.*, 1952.

A disease causing the death of stone fruit trees is being investigated at the Plant Diseases Division, Auckland, where preliminary work suggests the causal organism to be a bacterium [cf. *R.A.M.*, 32, p. 232 and next abstract]. All stone fruits are attacked, most losses occurring on trees three to six years old. One of the first external symptoms is the exudation of droplets of gum; internally the diseased tissue is dark brown. The diseased bark, when cut, gives off a strong odour from which comes the term 'sour sap' [cf. below, p. 36] for this condition. Young trees often die outright, whereas older ones die slowly, one limb at a time. Other symptoms in addition to the die-back are the yellowing and upward rolling of the leaves, and spots on leaves and fruit. On leaves the spots are at first watersoaked and later drop out, and on fruit they vary according to the variety.

Dye (D. W.). **Control of Pseudomonas syringae with streptomycin.**—*Nature, Lond.*, 172, 4380, pp. 683–684, 1953.

Greenhouse experiments on the control of stone fruit blast (*Pseudomonas syringae*) [see next abstract] in New Zealand were conducted at the Plant Diseases Division, Auckland, using 23 proprietary therapeutants and five antibiotics. The stems of vigorously growing peach trees, pricked lightly at 15 points with a sterile needle, were sprayed with the solutions and, 1½ hours later, with a culture of *P. syringae*. They were incubated for three days at 12° C. and 90 per cent. relative humidity and then for a further seven days at 16±6° subjected to a water mist for 35 seconds every 3½ hours, after which the number and length of the lesions were recorded.

None of the therapeutants was highly efficient. The best, SR-406 [captan], used at 2 and 3 lb. per 100 gals. water, permitted lesion development at 53 and 60 per cent. of the needle pricks as against 88 and 93 per cent., respectively, on the controls sprayed with water; at 4 lb. it caused considerable foliage damage. Streptomycin sulphate was easily the best of the antibiotics and caused no damage. Plants sprayed at concentrations of 500 and 1,000 μgm. per ml., respectively, developed lesions 2·3 and 1·3 mm. long at only 12 and 10 per cent. of the inoculation points compared with lesions 3·1 mm. long at 88 and 93 per cent. of the points on the controls. Aureomycin was effective only at 1,000 μgm. per ml. (20 per cent. infection). Further experiments are in progress.

Day (L. H.). **Rootstocks for stone fruits. Observations and experiments with Plum, Peach, Apricot, and Almond roots for stone fruits.**—*Bull. Calif. agric. Ext. Serv.* 736, 76 pp., 24 figs., 1953.

This bulletin summarizes 30 years of observation and experiment on the behaviour of four rootstocks with various stone fruit varieties. Sections are included dealing with the resistance of stocks to diseases (pp. 9–14), tolerance of wet soils

in connexion with disease (pp. 18–72), and the relation of stocks to mineral deficiency and excess. Trees on peach, apricot, and almond roots are more susceptible to *Armillaria mellea* [*R.A.M.*, 27, p. 372] than those on myrobalan (*Prunus cerasifera*). Almond roots are the most susceptible to crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) [32, p. 25] followed by peach, myrobalan, and apricot, in that order. Susceptibility to blackheart (*Verticillium albo-atrum*) [loc. cit.] seems variable in different localities, though apricot is susceptible on all stocks, and so are myrobalan seedlings. Bacterial gummosis (*Pseudomonas syringae*) [31, p. 69] affects trees on myrobalan and Marianna plum roots more than those on peach. Infection by *Phytophthora* spp. in wet soil causes crown rot [loc. cit.] to which apricot rootstocks are the most resistant and almond the least.

The condition known as 'sour-sap' [cf. above, p. 35] arises in trees on land subjected to flooding or which is poorly drained, and may be associated with crown rot, bacterial gummosis, and blackheart. Roots may be suffocated by lack of oxygen, peach being more resistant to this than apricot. Myrobalan and peach are both sensitive to alkali salts in the flood water. Myrobalan trees will tolerate submergence in running water for longer periods than in stagnant water. Trees on almond roots are most tolerant of alkali soils and also excess boron, while those on apricot roots are relatively more resistant to zinc deficiency. Prune trees [31, p. 336] on almond roots are more affected by potassium deficiency than those on peach.

Krythe (J. M.). **Onderzoekingen over mozaiek of bontbladigheid van Perzik-en Pruimebomen.** [Studies on mosaic or leaf variegation of Peach and Plum trees.] —*Tijdschr. PlZiekt.*, 59, 2, pp. 51–61, 1 fig., 1953. [English summary.]

The symptoms of a virus disease affecting the foliage of peach and plum trees in Holland since 1946 include yellow lines, rings, oak-leaf patterns, and vein-clearing. They do not altogether correspond to those of any of the 46 viruses hitherto reported on stone fruits, the closest agreement being with [peach] line-pattern virosis [*R.A.M.*, 21, p. 146 *et passim*], a *Prunus* mosaic occurring in France [15, p. 515], and the New Zealand plum mosaic [30, p. 361]. All the 33 peach varieties examined were infected and also Early Rivers, Early Laxton, Doyenné, Reine Claude d'Althan, Ruth Gerstetter, Utility, Victoria, and Ontario plums, the preserving variety Okkelaan, and several stocks, including Brompton and Pershore. An anatomical study of the spots on peach leaves revealed minute, shrunken chloroplasts sporadically distributed through the palisade; in the yellow areas no starch was found. The pale green spots and oak-leaf patterns on plum leaves were much less distinct than on peach, with the exception of Okkelaan, on which the yellow areas were sharply delimited. Lindner's colour reaction proved to be useless for diagnostic purposes [32, p. 387].

The virus, which occurs exclusively on budded trees, was transmitted by budding but not by sap inoculation or (judging from the results of experiments to date) by insects, soil, or seed. Control can be effected only by the use of healthy stocks, scions, and budwood.

Blumer (S.). **Die Bekämpfung des Zwetschgenrostes.** [The control of Plum rust.]— *Schweiz. Z. Obst- u. Weinb.*, 62, 1, pp. 5–9, 2 figs., 1953.

In experiments at an agricultural college in the canton of Zürich, Switzerland, in 1952, the best control of plum rust (*Tranzschelia* [*Puccinia*] *pruni-spinosae*) [*R.A.M.*, 31, p. 613] on trees of five varieties, including Fellenberg, Mirabelle de Nancy, and Pfirsichpflaume [peach plum], was achieved by the use of the standard schedule [loc. cit.] for the pre- and post-blossom sprays on 28th April and 7th May, respectively, followed by two further treatments on 23rd May and 10th June with

1 per cent. lime-sulphur plus 0·1 per cent. iron sulphate (A) on the first date and no spray on the second, (B) on both dates, or (C) with the thiocarbamate M555 at 0·2 per cent. on both dates, or (D) 0·75 per cent. organol on both dates. The average ratings (in a scale ranging from 0 for no infection to 5 for a very heavy attack with extensive defoliation) were 3, 1·7, 0·1, and 1·4 for the four treatments, respectively.

Bollard (E. G.). **Zinc deficiency in Peaches and Nectarines.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 1, pp. 15–18, 4 figs., 1953.

Zinc deficiency symptoms were observed on peach [cf. *R.A.M.*, 29, p. 569] and nectarine [cf. 23, p. 491] trees in Central Otago, New Zealand. The disorder is characterized by chlorosis and reduction in leaf size and rosetting and die-back of leaders. When leaf chlorosis appears alone the symptoms may be confused with those of manganese deficiency [25, p. 2; 32, p. 632]. Foliage sprays of zinc sulphate (3 lb.) plus hydrated lime (4 lb. in 50 gals. water) rectified the disorder.

KenKnight (G.) & Jones (J. F.). **Apparent absence of the ring spot virus in the Peach variety collection at the U.S. Horticultural Station, Fort Valley, Georgia.** —*Plant Dis. Reptr*, 37, 6, p. 346, 1953. [Multilithed.]

No ring spot virus [*R.A.M.*, 31, p. 129] was detected in any of the 62 peach varieties indexed to Lovell seedlings at Fort Valley, Georgia, in 1952.

Bollard (E. G.). **Severe potash deficiency in young Peach trees.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 1, pp. 39–44, 5 figs., 1953.

Potassium deficiency was found to be responsible for the poor growth and severe marginal necrosis of the leaves of young peach trees [cf. *R.A.M.*, 28, p. 463] in the Auckland district of New Zealand in the autumn of 1950. Older leaves were affected first and on many the necrotic margin fell away, producing a tattered effect. Leaf fall on affected trees was early. Potassium dressings (5 cwt. per acre) rectified the disorder. Tissue tests showed differences in the potassium status of affected and healthy trees.

Guba (E. F.). **Peach canker caused by the fungus Fusicoccum persicae E. & E.**— Abs. in *Phytopathology*, 43, 2, p. 109, 1953.

For several years past peach canker (*Fusicoccum persicae*) [*R.A.M.*, 13, p. 183] has caused heavy damage in two orchards in south-eastern Massachusetts. Only the current season's terminal growth is susceptible, suckers being most severely attacked, principally at the nodes. The cankers are perennial, completely girdling and ultimately killing the branches. Pycnidia and conidia develop throughout the season, being most abundant in the early part. Further injury results from the invasion of the cankers by *Cytospora* [*Valsa* spp.: 27, p. 569] and other wound parasites. In 1952 almost complete control of infection on the new growth was obtained by a protectant schedule of ferbam, followed by thiram or orthocide [captan: 32, p. 685 and next abstract] and supplemented by canker excision and sanitation.

Hamilton (J. M.) & Szkolnik (M.). **Factors involved in the performance of cycloheximide (actidione) against Coccomyces hiemalis.**—Abs. in *Phytopathology*, 43, 2, p. 109, 1953.

Actidione at a concentration of 2 p.p.m. proved equal or superior to fermate, manzate, orthocide 406 [captan: see preceding abstract], and copper oxychloride copper sulphate for the protection of potted Montmorency and English Morello cherry trees inoculated with conidia of *Coccomyces hiemalis* [? in New York State:

cf. *R.A.M.*, 31, p. 129] when sprayed on the leaves after an incubation period of 96 hours, during which penetration of the palisade cells was effected. The compound required at least an hour's contact with the foliage to attain its maximum efficiency, which was not impaired by water with a pH of 7·8 but was reduced by the addition of lime at a strength of 3 in 100. Actidione was found to be compatible with methoxychlor. It may diminish fruit set and size if applied within a ten-day period beginning with 'shuck' split.

Kemp (W. G.). **Studies on the physiology of Elsinoe veneta.**—*Canad. J. Bot.*, 31, 4, pp. 411–422, 1 graph, 1953.

In studies on the raspberry anthracnose organism, *Elsinoe veneta* [*R.A.M.*, 31, p. 51], at the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa, maximum mycelial growth occurred in the presence of soluble starch and asparagine, while optimum conidial production was obtained on media containing potato starch and sodium nitrate. In general the numbers of conidia decreased markedly on media favouring excessive vegetative growth. Mycelial production was affected adversely by a reduction in the volume of the medium and in the concentration of either a specific nutrient or of total nutrients. Temperatures above 30° C. and below 21° decreased the percentage germination of the conidia and restricted fungus growth. Growth and sporulation occurred over a wide pH range, the optimum initial pH being 4, and in either continuous darkness or alternate diffuse light and darkness. Young, potted raspberry plants in the greenhouse developed typical anthracnose lesions when inoculated with conidia produced in culture.

Colborne (F.). **Legislation for the control of bunchy top in Bananas.**—*Qd agric. J.*, 77, 2, pp. 85–90, 2 figs., 1953.

The history of legislation for the control of bunchy top virus of bananas [*R.A.M.*, 32, p. 262] in Queensland is reviewed and the present requirements are summarized. A grower wishing to establish a new plantation must apply to the Banana Industry Protection Board. Standards of plantation management, grades and sources of planting material, and time of planting are all prescribed by the Board.

Patel (M. K.), Allayyanavaramath (S. B.), & Kulkarni (Y. S.). **Bacterial shot-hole and fruit canker of Aegle marmelos Correa.**—*Curr. Sci.*, 22, 7, pp. 216–217, 1 fig., 1953.

A description is given of *Xanthomonas bilvae* n.sp. which caused shot hole and fruit canker of bilva (*Aegle marmelos*) growing at the Agricultural College Farm, Poona, India, in August, 1952. Round, watersoaked spots surrounded by a clear halo appeared on the leaves, increasing in size to form brown depressed lesions encircled by an oily, raised margin, and later coalescing and becoming chlorotic. The dead tissue either falls out or remains attached, though separated from the surrounding healthy tissue. The fruit spots, 4 to 7 mm. in diameter, are similar but become very corky, irregularly shaped, and chocolate brown. Twigs and thorns are also attacked, large lesions (150 by 4 mm.) usually appearing on the former. Bacterial, gummy exudate is common on all infected parts.

The bacterium is a short rod, 1·5 by 0·9 μ, single or in chains of two, Gram-negative, and grows well on potato dextrose and nutrient agars. Starch and casein are hydrolysed; gelatin liquefied; acid (but no gas) is produced from dextrose, lactose, and xylose but not from salicin; ammonia and hydrogen sulphide are formed; and litmus reduced. The optimum growth temperature is 25° to 27° C. and the thermal death point is about 52°.

X. bilvae infects lime, though it does not produce leaf canker, and *Feronia elephantium*. *X. citri* failed to infect bilva.

Owens (R. G.). **Studies on the nature of fungicidal action. I. Inhibition of sulfhydryl-, amino-, iron-, and copper-dependent enzymes in vitro by fungicides and related compounds.**—*Contr. Boyce Thompson Inst.*, 17, 3, pp. 221–242, 4 graphs, 1953.

Studies at the Boyce Thompson Institute for Plant Research, New York, demonstrated that the effects of fungicides on the activity of the prepared enzymes amylase and catalase [*R.A.M.*, 32, pp. 647, 677] and polyphenol oxidase (tyrosinase) extracted from mushrooms varied according to the properties of the chemicals and the nature of the active enzyme group. Sulphur was relatively ineffective against any of the enzymes, but dithiocarbamates inhibited all of them; evidence is presented or cited to indicate that inhibition results from the formation of a complex with the metals of the metal-containing enzymes, polyphenol oxidase and catalase, and from interference in electron shifts. Inhibition by phenolic compounds depended upon ring constitution and substitutions. Chlorination or substitution promoting quinone formation enhanced inhibition of all the enzymes tested except polyphenol oxidase. Inhibition of pancreatic amylase by phenylmercuric acetate as a function of chemical concentration reached two maxima, whereas inhibition of this enzyme by mercuric chloride and of malt amylase by both compounds varied with chemical concentration in the normal manner. Quinones were highly inhibitory to the two amylases and moderately so to catalase. Inhibition of amylases was increased markedly by incubating them with quinones but only slightly by incubation with mercury or copper ions.

Inhibition of pancreatic amylase by quinones was completely reversed by glutathione or cysteine, while inhibition of polyphenol oxidase by sodium diethyldithiocarbamate was only partially reversed by the metallic ions tested.

Possible relationships between the properties of the chemicals involved, interaction mechanisms, and *in vivo* toxicity are indicated. A bibliography of 55 titles is appended.

Miller (L. P.) & McCallan (S. E. A.). **Studies on fungicidal action using radioactive tracers.**—*Trans. N.Y. Acad. Sci.*, Ser. II, 14, 8, pp. 329–331, 1952.

Some of the work dealt with in this paper has already been noticed from other sources [*R.A.M.*, 32, pp. 576, 577]. Mycelia of powdery mildews [Erysiphaceae] absorb much more sulphur than the surrounding host tissue. The fungicides, ferbam, ziram, nabam, zineb, and thiram, in the presence of water, liberate small amounts of carbon disulphide, but this is increased many times by the presence of fungus spores.

Ehlers (M.). **Methoden zur Prüfung von Pflanzenschutz- und Vorratsschutzmitteln LIV. Zur Frage der Dosierung bei der laboratoriumsmäßigen Prüfung von Pflanzenschutzmitteln.** [Methods for the assay of plant- and stores-protectives LIV. On the question of dosage in laboratory tests of plant-protectives.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 5, 4, pp. 60–62, 2 figs., 1 diag., 1953.

The appliances and methods of operation used at the Schering A.G. laboratory, Berlin, for the assay of plant-protective dusts and sprays are described [cf. above, p. 15]. The equipment for testing dusts comprises an assemblage of three cabinets for dusting, dosage, and weighing. The dusting cabinet is a removable plywood box, 30 by 30 by 30 cm., with a detachable lid. It fits above the dosage cabinet, at the bottom of which is a removable tray for the test plant. Through the tray projects a rod carrying a rectangular piece of aluminium foil, 8 by 20 cm., which serves to catch a sample of the dust falling from the dusting cabinet above. Separating these two is a movable section which can be drawn in and out. The dosage cabinet is shut

off from the weighing box, which contains a very sensitive, non-damping inclined balance with a scale enabling the load on the aluminium surface to be read off.

The spray-assay apparatus is based on the same principles as the foregoing, except that it consists merely of a normal analytical balance and a combined spraying and dosage cabinet, open at the front and top. One arm of the balance carries a contrivance for the suspension of the dosage surface, consisting of a ring of aluminium foil with an external diameter of 30 cm. and a surface area of 250 sq. cm., which rests on a wire support. The plants and specimens for treatment are placed in the centre of the ring or on a rotary stand in such a way as to receive a uniform dosage from all sides.

Inoue (Y.) & Tomizawa (C.). **Insecticidal and fungicidal actions of thiophene and its derivatives.**—*Botyu Kagaku*, 18, pp. 33–38, 1953. [Abs. in *Chem. Abstr.*, 47, 12, p. 6084, 1953.]

In tests at Kyoto University, Japan, spore germination of *Piricularia oryzae*, *Ophiobolus graminis*, and *Macrosporium bataticola* was suppressed to a considerable extent by thiophene mercuric chloride. At a concentration of 0·001 per cent. the compound inhibited the germination of *P. oryzae* spores and was thus about equally effective with phygon [*R.A.M.*, 32, p. 505], while at 0·01 per cent. it completely eliminated seed infection and tended to stimulate germination.

Ramsbottom (J.). **Mushrooms and toadstools.**—xiv+306 pp., 70 pl. (46 col.), London, Collins (New Naturalist 7), 1953. 30*s*.

Particular attention has been paid in this attractively produced and excellently illustrated volume (84 species are depicted in colour) to the history of fungi, their names, uses, and legendary associations, as revealed in old treatises. Among the 23 chapters may be mentioned two on poisonous and edible fungi, while others are devoted to mushroom-growing, spore production and spore characters, sex, fairy rings, rhizomorphs and sclerotia, ergot and *Cordyceps*, luminosity, mycorrhiza and other fungal associations, dry rot, ecological and physiological aspects of fungi, truffles, and penicillin. An eight-page bibliography is appended.

Alexopoulos (C. J.). **Introductory mycology.**—xiii+482 pp., 187 figs., New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Ltd., 1952. 56*s*. net.

This elementary textbook is intended mainly for students newly approaching the subject. The author describes and discusses the structure of the fungi with stress on the life-histories of representative organisms, giving the basis of what he considers the most acceptable system of classification, with general remarks on the probable relationships of the main groups. Following a general introductory chapter the next two deal with the phyla Schizomycophyta and Myxomycophyta. Thirteen chapters are concerned with the Eumycophyta, four being allotted to the Phycomycetes, five to the Ascomycetes, one to the Deuteromycetes, and three to the Basidiomycetes. The final chapter is a very brief one on the lichens. Each chapter is followed by a summary and a list of useful references for further work, and there is a glossary of mycological terms. A helpful feature is the inclusion of illustrated life-cycles for a great many of the species selected to illustrate the groups.

Alexopoulos (C. J.) & Beneke (E. S.). **Laboratory manual for Introductory mycology.**—iv+177 pp., 17 pl., Minneapolis, Burgess Publishing Company, 1952. $3.25. [Mimeographed.]

This loose-leaf manual is designed to assist students who have completed a one-year course in biology to systematize their laboratory studies of fungi. The first

part (pp. 1–13) describes some useful practical methods for making preparations, with some special techniques, and the second (pp. 14–175) deals with representative examples of the different classes and orders of bacteria, myxomycetes, and fungi. Each short section of the second part is provided with a list of questions, text references to the senior author's 'Introductory mycology' [see preceding abstract] and Bessey's textbook [*R.A.M.*, 30, p. 381], other selected references, and a glossary of technical terms which are also indexed at the end of the manual.

Ordish (G.). **Untaken harvest.**—xii+171 pp., 5 graphs, London, Constable & Co. Ltd., 1952. 15*s.* net.

In this valuable compilation of material not hitherto gathered together the economics and social consequences of crop losses due to insects, animals, fungi, bacteria, viruses, and weeds are discussed, and details of present and future crop protection are reviewed. Tables show crop losses in the United Kingdom, the United States, South Africa, Australia, and Spain, and some statistics on the world production and consumption of pesticides between 1939 and 1950. A bibliography of 118 titles is arranged under chapter headings.

Motte (J.). **Spore, conidie, et quelques autres termes utilisés en cryptogamie.** [Spore, conidium, and certain other terms used in mycology.]—*Rev. Mycol.*, 17, 2, pp. 171–178, 1952.

The author discusses the definitions applied to spore, conidium, and various other terms by mycologists during the past century and a half and concludes that the best concept is that which regards the conidium as a neo-formed disseminating element, unicellular or, if multicellular, simple in structure, not immediately connected with fertilization and meiosis. Conidia, spores, and other disseminating organs cannot be defined merely by the characters that fit them for dispersal, but should be considered in relation to the life-cycle of the fungus.

The author suggests the following as basic terms: biont, for the individual, cyte, for architectural elements of which it is composed, spore, for the initial cyte of the haploid biont, gamete, zygote, and conidium, adding prefixes, such as diplo-, dicaryo-, coeno-, plano-, endo-, chlamydo-, etc., to define further the various elements.

Pady (S. M.) & Kapica (L.). **Air-borne fungi in the Arctic and other parts of Canada.**—*Canad. J. Bot.*, 31, 3, pp. 309–323, 1953.

Most of the further work on this subject [cf. *R.A.M.*, 32, p. 494], concerned with an analysis of the fungi trapped in flights over Alaska and the Canadian Arctic and Northwest Territories during 1949 and 1950, has already been noticed [cf. 32, p. 439]. *Cladosporium* was the commonest fungus near the ground in summer at Fort Churchill, Manitoba, averaging 0·5 per cu. ft., followed by yeasts (0·16), *Penicillium* (0·06), and *Stemphylium* (0·03). Of 3,711 colonies 57 per cent. failed to sporulate. Silicone slide readings at the same place attained 114·9 spores per cu. ft. and included yeasts (8·6), *Cladosporium* (3·8), smuts (chiefly *Ustilago* spp. 2·5), *Fusarium* (0·6), *Alternaria* (0·06), *Venturia*, *Cercospora*, *Septoria*, rusts [*Puccinia* spp.], *Leptosphaeria*, *Sordaria*, *Pleospora*, and many hyaline, unicellular spores. It appears that the majority of trapped spores are no longer viable.

There is evidence that the numbers of fungi are correlated with the air masses.

Brodie (H. J.) & Gregory (P. H.). **The action of wind in the dispersal of spores from cup-shaped plant structures.**—*Canad. J. Bot.*, 31, 4, pp. 402–410, 1 pl., 1 diag., 1953.

At Rothamsted Experimental Station, Harpenden, Herts., *Lycopodium* spores in glass vessels of various shapes and sizes were subjected to wind velocities ranging

from 0·6 to 7·1 m. per sec. [*R.A.M.*, 31, p. 251]. The spores were blown from funnel- or egg-cup-shaped vessels more readily than from rectangular vessels or horizontal glass slides. They were not dispersed visibly from a conical funnel having a mouth 4 cm. in diameter at velocities below 3 m. per sec. Soredia of the lichen *Cladonia* [31, p. 197] were blown from their funnel-shaped podetia at velocities of 1·5 to 2 m. per sec. (3·3 to 5·3 miles p.h.) but not from a horizontal glass slide. The mechanism involved is discussed.

Blair (I. D.). **Disease avoidance and crop rotation.**—*Agric. Bull. Canterbury Chamb. Comm.* 272, 4 pp., 1952.

A list is given of the most important soil-borne diseases of wheat, barley, potatoes, brassicas, and peas [*R.A.M.*, 32, p. 415], and methods of crop rotation to prevent such diseases are suggested. For the control of take-all (*Ophiobolus graminis*) [32, p. 236 and above, p. 14] in New Zealand the recommended under-sown grass mixture for soils of high fertility is 15 to 20 lb. [per acre] Italian rye grass [*Lolium multiflorum*] with 4 to 5 lb. broad red or crimson clover [cf. 27, p. 183].

Peas and potatoes should precede a wheat crop on land immediately after pasture is broken up, otherwise eyespot lodging (*Cercosporella herpotrichoides*) [32, p. 245] may be heavy on autumn-sown wheat. If peas are sown after grass and before a wheat and barley succession, disease is unlikely to be important in either peas or cereals.

Potato tuber blight (*Phytophthora infestans*) [32, p. 501] in the field appeared to be restricted where potatoes were planted after a green manure crop, preferably of lupins. In 1945 an average of 35 per cent. rotted tubers occurred in second crop potatoes, but only 8 per cent. after lupins. This effect may be due to improved drainage and the suppression of the blight fungus by very active micro-organisms during lupin decay. Peas should not be sown after a blight-infested potato crop if decayed tubers are left in the ground as pre-emergence decay develops.

[Kominami (K.).] **An additional list of cultures, maintained in the Japanese Type Culture collection, Nagao Institute, Kitashinagawa, Tokyo. Supplement II.**—*Nagaoa* (*Mycol. J. Nagao Inst., Tokyo*), *1952*, 2, pp. 127–133, 1952.

This list supplements the previous one [*R.A.M.*, 32, p. 636], adding a further 89 species and strains of bacteria, fungi, and algae to the Japanese Type Culture Collection, Nagao Institute, Tokyo.

Baker (K. F.). **Moisture and diseases.**—*Flor. Rev.*, 108, 2798, pp. 15–16, 46–51, 1951. [Received 1953.]

Aerial moisture is a critical factor in the spread, infection, and sporulation of organisms that cause diseases of florists' crops. Condensation in the greenhouse may be prevented by the proper balance of heat and ventilation. The means whereby the semi-arid Californian climate might be exploited to reduce disease losses, and practices which counteract its benefits avoided, are discussed.

Luteraan (P.-J.) & Guyotjeannin (C.). **Un procédé facile de culture sur lames.** [An easy method for culture on slides.]—*Rev. Mycol.*, 17, 2, pp. 158–160, 1952.

A new, simple method of slide culture [cf. *R.A.M.*, 11, p. 795] is described. Four glass slides are arranged round a Pyrex glass cylinder inside a Pyrex glass tube, which is then stoppered with a cotton plug, covered with gauze and sulphurized paper, and autoclaved. A sterilized, filtered agar medium is then poured into the tube, which is again sterilized. While cooling, the tube is inclined and rotated so that the slides become coated with the medium. Inoculation is carried out as with a slant culture.

Servazzi (O.). **Sull' uso del blu diretto in fitopatologia.** [On the use of direct blue in phytopathology.]—*Nuovo G. bot. ital.*, N.S., 59, 2–4, pp. 497–499, 2 figs., 1952. [Received October, 1953.]

Since 1931 the author has made frequent use for staining purposes of 'direct blue 7R' (Meister Lucius u. Bruning di Hoechst, Germany, now Farbwerke Hoechst), widely employed in textile and dyeing processes and so called because it colours cotton directly in an alkaline solution. Not only does it stain those organs which have selectivity for it a beautiful violet hue, so that in one and the same species the hyphae may be deeply coloured, and the spores or conidia appear paler, but it produces a satisfactory effect in certain cases where aniline blue and other staining materials do not.

Turner (J. N.). **Measurement of mould growth on solid substrates.**—*Trans. Brit. mycol. Soc.*, 36, 2, pp. 159–162, 1953.

For measuring mould growth on a solid material, such as leather [*R.A.M.*, 31, pp. 75, 208], a rapid method which yields numerical values is to remove all the spores from the surface and count them. For this purpose a piece of 0·5 cm. bore glass tubing about 20 cm. long bent at right angles to give a side-arm of approximately 5 cm. is used. The end is flattened and ground to produce a fishtail jet with a narrow, even aperture. A quantity of powdered borax (less than 60-mesh) is introduced into the wide end of the inverted tube to a depth of 1 cm. and plugged tightly with cotton wool. When connected to a water pump all spores from the grain surface of a mouldy piece of leather are removed. The contents are then washed to free the spores from mycelium and leather dust and suspended in liquid.

The liquid is centrifuged for 5 minutes at 3,000 r.p.m. in a short 3 cm. diameter tube joined to a capillary of 1 mm. internal diameter and 5 cm. long to provide a total volume of about 8 ml. The length of the spore column is measured by means of a travelling microscope. This method gave the same accuracy as haemacytometer counts. Average spore size in a mixed culture may be deduced by relating the centrifuge readings to the spore count.

Andrews (H. N.). **Frozen Mushrooms for class study.**—*Science*, 118, 3064, p. 331, 1953.

Fleshy specimens of the larger fungi, normally quickly deteriorating, were kept in a fresh condition from August until the following February by packaging and then freezing until required.

Brown (Frances C.), Bradsher (C. K.), & Lawton (Elise N.). **Mildew-preventing activity of rhodanine derivatives. Ketone derivatives.**—*Industr. Engng Chem.*, 45, 5, pp. 1027–1030, 1 graph, 1953.

Rhodanine having proved ineffectual in the protection of cotton cloth against *Chaetomium globosum* [*R.A.M.*, 32, pp. 94, 495, and next abstract], experiments were performed at the Department of Chemistry, Duke University, North Carolina, to determine the possibility of an improvement in this direction through changes in the structure of the fungicide. The assay of 25 compounds of the R′ = H type (resulting from condensation with aldehydes) involved pure culture and soil burial (two and four weeks) tests on 6 by 1 in. strips of cotton twill inoculated with the fungus and impregnated with the fungicides at a concentration of 2 per cent.

Preservative activity was found to depend on the length of the side chain. The lower members of the series were not effective in the drastic four-week soil burial tests, but a marked increase in activity commenced with the propyl group and reached a maximum in the amyl, one of the most potent mildew-preventives being 5-(*a*-*n*-amylethylidene)rhodanine, erroneously reported as *a*-*n*-amylhexylidene-rhodanine in a previous contribution [30, p. 528]. The presence of more than five

carbon atoms in the normal alkyl group connotes a heavy drop in protective activity, which is virtually non-existent with nine, even in the relatively unexacting pure culture tests. Activity was enhanced by the introduction of a methyl group in the *para* position of the cyclohexyl ring and lowered by that of a tertiary amyl group in the same position, as compared with the unsubstituted cyclohexylidene derivative. A methyl group in the *meta* position of the cyclohexylidene ring reduces protective efficiency, while the same group in the *ortho* or *para* position produced compounds of extreme toxicity to [unspecified] cellulolytic soil organisms [31, p. 394]. It was further shown that the excellent protection conferred by 5-cyclohexylidenerhodanine or 5-(*p*-methylcyclohexylidene)rhodanine is partially or wholly lost if the hydrogen in the 3-position of the rhodanine nucleus is replaced by alkyl or aryl groups. Thus, the size and shape of the molecule, as well as the presence of toxic groups, appear to be important factors determining the efficacy of mildew-proofing agents.

Brown (Frances C.), Bradsher (C. K.), & Bond (Sara M.). **(Mildew-preventing activity of rhodanine derivatives.) Some 5-arylidene derivatives.**—*Industr. Engng Chem.*, 45, 5, pp. 1030–1033, 1953.

In further experiments on the toxicity of rhodanine derivatives to *Chaetomium globosum* [see preceding abstract], by far the most effective of the 31 simple benzylidenerhodanines studied were the alkyl and halogen derivatives, five compounds being sufficiently active to prevent more than 30 per cent. loss in tensile strength of cotton strips after a month's soil burial. The measure of protection conferred by 5-benzylidenerhodanine was decreased when the hydrogen atom of the phenyl nucleus was replaced by a phenolic or alkoxyl group. Activity was enhanced by the introduction of a methyl group, especially in the *ortho* position, into the benzylidene part of the rhodanine derivative.

Hopf (P. P.). **Developments in fungicide-containing paints.**—*Paint Manuf.*, 23, 2, pp. 49–50, 1953.

A brief exposition of the chief requirements and major uses of fungicide-incorporating paints is followed by a note on phemox, a phenyl mercury complex of 8-hydroxyquinolinol supplied by Ward, Blenkinsop & Co., Ltd., London. At a concentration of 0·3 per cent. it affords complete protection against [unspecified] micro-organisms and compares favourably in this respect, as well as in its low degree of toxicity, with copper-8-hydroxyquinolinolate, widely used for the same purpose in the United States.

Newton (W.). **Antagonism by species of Alternaria and the isolation of a crystalline substance from the filtrate of cultures of A. radicina.**—*Canad. J. Bot.*, 31, 4, pp. 423–425, 1 pl., 1 graph, 1953.

At the Laboratory of Plant Pathology, Saanichton, British Columbia, the culture filtrates of five *Alternaria* spp. were antagonistic to *Phytophthora erythroseptica*, the order of effectiveness being *A. radicina*, *A. dianthicola*, *A. solani* [*R.A.M.*, 32, p. 636], *A. brassicicola*, and *A. tenuis*. The filtrate of *A. radicina* was also strongly antagonistic to *Pythium ultimum* and *Sclerotinia trifoliorum*. It yielded numerous colourless, needle-like crystals, their deep pink colour in sodium hydroxide solutions distinguishing the substance from alternaric acid [loc. cit.]. In water suspensions the crystals were far less antagonistic to *Phytophthora erythroseptica* than the original filtrate.

Wood (R. K. S.). **The antagonism of Lambertella corni-maris to fungi and bacteria.**—*Trans. Brit. mycol. Soc.*, 36, 2, pp. 109–110, 1953.

Lambertella corni-maris [*R.A.M.*, 28, p. 478], grown on a variety of agar media

in the Department of Mycology and Plant Pathology, Imperial College, London, was markedly antagonistic to *Botrytis cinerea* and to several other fungi and bacteria. The reaction was not attributed to pH change in the medium. The supernatant fluid from liquid cultures was also active except against *B. cinerea*, where it was unexpectedly ineffective in inhibiting spore germination.

Bredemann (G.). **Zur Biologie des Endophyten in den Früchten des Leinlolchs (Lolium remotum Schrank).** [On the biology of the endophyte in the seeds of Flax Darnel (*Lolium remotum* Schrank).]—*Zbl. Bakt.*, Abt. 2, 107, 8–10, pp. 151–168, 4 figs., 1953.

Essential to the elucidation of various problems connected with the toxicity to human beings and livestock of cereal grain contaminated by seeds of *Lolium remotum* is an adequate supply of endophyte-free material [cf. *R.A.M.*, 32, p. 318], which was secured in the author's experiments at the Institute for Applied Botany, Hamburg, by hot water treatment (preceded by three hours' pre-soaking at room temperature) for 12 minutes at 56° C. in the case of fresh seed, 10 minutes at 55° for two-year-old, or at 52° for three-year-old. The viability of the endophyte declines rapidly and may be completely lost by the fifth year in storage, when the seed is still germinable, under favourable conditions, to the extent of 70 per cent.

Baldacci (E.). **In merito alla relazione fra le sostanze di crescita e i fenomeni patologici dello sviluppo, nei vegetali.** [On the subject of the relation between growth substances and pathological growth phenomena in plants.]—*Nuovo G. bot. ital.*, N.S., 59, 2–4, pp. 500–503, 1952. [English summary. Received October, 1953.]

The author puts forward the view that the similarity of the symptoms displayed in many growth diseases due to widely different etiological factors can be explained by the intervention of IAA [indoleacetic acid] and related growth substances already present in the affected tissues though in an inactive form. The pathological growth symptoms produced by certain viruses are due to the fact that these viruses form in the green tissue at the expense of the indole fraction of the cytoplasm proteins; during the formation of the virus nucleoproteins complete break-up of the protein occurs, followed by a new synthesis, with liberation of IAA. This liberation causes the pathological growth phenomena seen in these diseases, such as rugosity or wartiness of the leaves, leaf roll, etc.

The lengthening of the steles resulting from cellular hypertrophy in rice plants infected by *Fusarium moniliforme* [*Gibberella fujikuroi*] is not due to a specific growth substance produced by the fungus or to production of IAA in the metabolism of the fungus, but probably to interference by the metabolic products of the fungus with the production or inhibition of IAA in the plant.

Verona (O.). **Azione della vitamina K_5 su alcuni funghi, incluso funghi fitopatogeni.** [The action of vitamin K_5 on certain fungi, including phytopathogens.]—*Nuovo G. bot. ital.*, N.S., 59, 2–4, pp. 522–524, 1952. [English summary. Received October, 1953.]

When 47 species of fungi were grown on a medium containing 0·005 per cent. vitamin K_5 the growth of 44 per cent. of the fungi was arrested and the remainder made slow and difficult growth. Organisms which ceased to grow included *Aspergillus glaucus*, *Botrytis fabae*, *Candida pulcherrima*, *C. albicans*, *Colletotrichum lindemuthianum*, *Deuterophoma tracheiphila*, *Ophiobolus graminis*, *Rhizoctonia* [*Corticium*] *solani*, *Rosellinia necatrix*, and *Verticillium albo-atrum*. With 0·01 per cent. of the vitamin present *Alternaria solani*, *Aspergillus niger*, *B. cinerea*, *Endothia parasitica*, *Fusarium vasinfectum*, *Leptosphaeria herpotrichoides*, and

Penicillium notatum ceased growth, with 0·015 per cent. present, *F. solani*, and with 0·05 per cent., *Sclerotium rolfsii*.

Purvis (M. R.) & Barnett (H. L.). **Preservation of fungus cultures by freezing spores in water.**—*Proc. W. Va Acad. Sci.*, 24, pp. 65–67, 1952. [Received October, 1953.]

Spore suspensions of 21 species of fungi in sterile distilled water were kept frozen in capped test-tubes for varying periods of time before being melted and subcultured on agar. After two years 13 of the fungi were still viable, and 19 after one year. *Glomerella cingulata* and *Sphaeropsis malorum* [*Physalospora obtusa*] survived five months but not one year, while *Choanephora cucurbitarum*, *Phyllosticta solitaria*, and *Alternaria solani* were viable after one year but failed to germinate after 20 months. *Helminthosporium sativum* survived 20 months, while *Ceratostomella fimbriata*, *Botrytis cinerea*, *Neocosmopara vasinfecta*, and *Endothia parasitica* were still viable at the end of two years.

Barnett (H. L.) & Lilly (V. G.). **The effect of color of light on sporulation of certain fungi.**—*Proc. W. Va Acad. Sci.*, 24, pp. 60–64, 1952. [Received October, 1953.]

In experiments in the Botany Department, West Virginia University, the effects of light of different wavelengths were tested on the sporulation of *Dendrophoma obscurans*, *Schizophyllum commune*, *Trichoderma lignorum* [*T. viride*], *Sphaeropsis malorum* [*Physalospora obtusa*], *Endothia parasitica*, and *Choanephora cucurbitarum*. Growth under blue light was similar to that in white light, while in red light sporulation was delayed in *T. viride*, prevented in *D. obscurans* and *C. cucurbitarum*, and reduced in the other species, the response being similar to that in darkness. Responses to other wavelengths were intermediate between these two extremes.

Norris (D.). **Reconstitution of virus X-saturated Potato varieties with malachite green.**—*Nature, Lond.*, 172, 4383, p. 816, 1953.

In work at the Division of Plant Industry, Canberra, Australia, a single plant of the potato variety Early Carman, which is saturated with potato virus X [*R.A.M.*, 27, p. 222], was obtained free from the virus by the following method. Stem tips (1 cm. long), taken from a bacteriologically sterile clone propagated by tissue culture, were grown for three weeks in 50 ml. of liquid nutrient plus malachite green (3×10^{-6}) [31, p. 223]. The tips were then transferred to fresh liquid nutrient without the dye to recover and grow.

Folsom (D.). **Potato calico in Maine.**—*Plant Dis. Reptr*, 37, 6, pp. 347–348, 3 figs., 1953. [Multilithed.]

The yellow-mottled condition, observed in 1949 in a field in south-western Maine in scattered hills of the potato varieties Green Mountain, Katahdin, and X 1276–185 and again in 1950 and 1951 affecting the two last-named varieties and Chippewa, was due to the potato calico strain of lucerne mosaic virus [*R.A.M.*, 32, p. 334]. Greenhouse inoculations with the potato tuber necrosis strain of the same virus [30, p. 283] produced symptoms quite distinct from calico, though yellowing of the leaflets sometimes developed.

Blackwell (Elizabeth M.). **Haustoria of Phytophthora infestans and some other species.**—*Trans. Brit. mycol. Soc.*, 36, 2, pp. 138–158, 2 pl., 10 figs., 1 diag., 1953.

The appearance of haustoria formed by the invading mycelium of *Phytophthora infestans* [*R.A.M.*, 29, p. 319] in certain potato varieties is illustrated by photo-

graphs and explanatory drawings. In the tuber, but not in the leaf, the haustoria have a characteristic thickening which can be removed by treatment. The narrow entry of the haustorium through the host cell wall is demonstrated. In both leaves and tubers the sporadic occurrence of haustoria is interpreted as being due in part to the influence of the host cell. In the mesophyll the frequent presence of two haustoria in a fork of the branching mycelium is related to the check to hyphal growth by contact with a cell. Short lateral hyphal branches or 'diverticula' sometimes penetrate the narrow intercellular spaces of leaf and axis; no intracellular hyphae have been observed. In these studies haustoria were found frequently in the tubers of Arran Banner, Majestic, and Up-to-date and occasionally in Epicure and Gladstone; none were found in Arran Pilot and Doone Star. They were occasionally present in the leaves of King Edward and Majestic.

A list is given of the species of *Phytophthora* for which haustoria have been recorded, based on the literature from 1875 to 1950.

Black (W.). **Inheritance of resistance to blight (Phytophthora infestans) in Potatoes: inter-relationships of genes and strains.**—*Proc. roy. Soc. Edinb.*, Sect. B, 64, Part III, 17, pp. 312–352, 6 diags., 1952.

In further studies on potato blight (*Phytophthora infestans*) at the Scottish Plant Breeding Station [*R.A.M.*, 30, p. 69; 32, p. 394] the common strain A [32, p. 446] of the fungus and six specialized strains were used for testing potato varieties and seedling progenies bred from *S*[*olanum*] *demissum* for resistance to the disease. Four major genes for resistance were identified, viz., R_1, R_2, R_3, and R_4, each conferring hypersensitivity to the common strain and to a particular group of specialized strains. The genes are inherited independently in simple Mendelian fashion, but deviations from standard disomic ratios due to unpaired chromosomes, incompatibility factors, and partial autosyndesis occur in the segregations. A series of minor genes associated with morphological and physiological characters modifies the phenotypic expression of the major gene system and so determines the degree of susceptibility or resistance.

The so-called common strain of the fungus is regarded as a population persisting at an equilibrium determined by host range and environmental conditions [cf. 32, p. 586]. Specialization may occur in many directions, chiefly by mutation, but new forms survive only when the appropriate hosts are available and the environmental conditions suitable. Specialized races are unlikely to be more destructive to commercial potato varieties than the common strain, and some are appreciably less so.

Neumann (P.). **Über eine Mißbildung des Hypochnusstadiums der Rhizoctonia solani K.** [On a malformation of the *Hypochnus* state of *Rhizoctonia solani* K.] —*Z. PflBau*, 4 (48), 3, pp. 122–123, 1 fig., 1953.

Irregular, bracket-shaped, white to creamy-yellow or brown structures of a soft, tomentose consistency were observed at the bases of young potato plants at the Phytopathological Institute, Dachau, Upper Bavaria, Germany. Isolations from them were grown on malt extract agar to determine their possible connexion with *Hypochnus* [*Corticium*] *solani*. The developing mycelium, typical at first of *C. solani*, gave rise from the sixth to eighth day onwards to increasingly large numbers of fasciculate, curly, densely ramified elements resembling sporiferous hyphae. They had broader and considerably shorter cells than the ordinary form of *C. solani*, while the spacing of the branches was abnormally close. Thus, the sole difference lay in the extraordinarily compact habit of the atypical mycelium. There was no sign of spore formation after six months on agar, subcultures from the curly hyphae producing normal mycelium and sclerotia. The potato plants did not appear to be damaged by the fungus in its atypical form.

Hauptfleisch (K.). **Ertragssteigerungsversuche auf Kupfermangelböden.** [Yield increase experiments on copper-deficient soils.]—*Höfchenbr.* [*Wiss.*] 58–62, 1952. [Abs. in *Z. PflKrankh.*, 60, 3, p. 132, 1953.]

Substantial increases in the yields of potatoes on the copper-deficient moorland soils of Schleswig-Holstein, Germany [*R.A.M.*, 20, p. 297], were obtained by the use of a copper sulphate fertilizer (25 kg. per ha.), as well as by one to three spray applications (each at 6 kg. per ha.) of cupravit (OB21 Bayer, 45 per cent. copper oxychloride).

Belova (Mme O. D.). Определение пораженности Картофеля ямчатой и кольцевой гнилью. [Determination of infection of Potato by hollow and ring rot.]—Сад и Огород [*Orchard & Garden*], *1952*, 4, pp. 62–64, 1 fig., 1952.

Most of this information on potato hollow rot and ring rot [*Corynebacterium sepedonicum: R.A.M.*, 21, p. 40] in the U.S.S.R. has already been noticed from another source [loc. cit.; 20, p. 419]. Severe outbreaks of hollow rot, reaching up to 80 per cent. infected tubers, occurred in 1942 and 1944, each outbreak following a late wet summer in the preceding year. Infection of the tubers may be reduced by agricultural practices which favour maturation, avoidance of injury when digging, and disinfection with a 2 per cent. copper fungicide.

Sheffield (F[rancis] M. L.). **Virus diseases of Sweet Potato in parts of Africa.**—*Emp. J. exp. Agric.*, 21, 83, pp. 184–190, 1 map, 1953.

The virus nature of the mosaic disease of sweet potatoes in East Africa [*R.A.M.*, 32, p. 64] has been definitely proved by grafting experiments. Information about the symptoms, distribution, and spread of the disease has already been noticed [loc. cit.].

Nielsen (L. W.). **Cooler temperatures stop cork!**—*Res. & Fmg N.C.*, 10 (*Progr. Rep.* 2), pp. 6–7, 3 figs., 1951. [Received 1953.]

Work at the Agricultural Experiment Station, North Carolina State College, has shown that internal cork virus of sweet potato [*R.A.M.*, 32, p. 694] is almost completely prevented by storage at 55° F. First detected in S. Carolina in 1944 [25, p. 289], by 1950 the disease had infected 100 per cent. of the crop in N. Carolina. Cork damage does not reduce the yield so far as is known, nor does it affect the flavour of the cooked potato, but the market value is severely reduced. The longer the potatoes are kept in storage, and the higher the temperature, the more numerous and large the internal corky spots become. Potatoes stored for nine months at 55° showed no increase in symptoms. Lower temperatures cause pithiness in the tubers.

Report of the second meeting of the working party on Rice breeding, Bogor, Indonesia, 9th–13th April, 1951.—82 pp., F.A.O., Rome, 1951.

In the section of this report dealing with the rice varietal situation in Indonesia (pp. 17–23) the following lowland varieties are given as resistant to mentek [potassium deficiency: *R.A.M.*, 31, p. 140]: Brondol putih 277 (Reg. No. 14), Fadjar (2783), Intan (2400), Ketan Serang (1200), Naga dhau (83), Peta (2302), Salak (2885), and Tjahaja (2775).

On pp. 54–66 L. Ling contributes a paper entitled 'Review of information on certain diseases of rice' in which he discusses the symptoms, distribution, epidemiology, factors affecting, and control of five major rice diseases [30, p. 488]. The Philippine varieties Dumali, Khao Bai, Sri, Macan China, and Elonram, previously reported as susceptible to brown spot (*Cochliobolus* [*Ophiobolus*] *miyabeanus*) [loc. cit.], are herein described as relatively resistant. A bibliography of references is provided for each disease section.

Anerud (K.). **Några viktiga bristsjukdomar.** [Some important deficiency diseases.] —*Forsök o. Forskn.*, 9, 8–9, pp. 64–65, 4 figs., 1952.

This is a popular note on the symptoms and control of four important deficiency diseases in Sweden, namely, boron deficiency of beet, manganese deficiency of oats and potato, and copper deficiency of oats.

Wensley (R. N.). **Microbiological studies of the action of some selected soil fumigants.**—*Canad. J. Bot.*, 31, 3, pp. 277–308, 1953.

In microbiological studies at the Department of Botany, University of Toronto, and the Division of Botany and Plant Pathology, Ottawa, the efficiency of the soil fumigants methyl bromide [*R.A.M.*, 32, p. 589], a propane-propene mixture (50 per cent. 1, 3-dichloropropene) [29, p. 269], and ethylene dibromide [loc. cit.] was tested in two types of soil at 75° F. by shaking them with the soil in screw-top jars. Critical exposure concentration was that required to reduce a population by 90 per cent. (as determined by plate counts) in a specific period. Critical exposure period was that period of confined exposure of 1 kg. soil required to cause a 90 per cent. reduction. The product of these two values (efficiency index) was excellent for rating the fumigants. The soil moisture-level did not materially affect fungicidal efficiency but soil type did. A soil with a high content of organic matter requires a longer exposure period and a greater concentration. The efficiency of each fumigant was classed as high (efficiency index 1 to 12), medium (13 to 48), low (49 to 96), or poor (over 96).

Methyl bromide was the most effective fumigant against fungi, bacteria, and actinomycetes, 0·2 ml. per kg. soil for 16 hours killing all but the most resistant. Efficient concentrations of and exposure periods for ethylene dibromide and the propane-propene mixture were considered too high for practical purposes. Soil fumigation effectively altered the microbiological balance in favour of fungi that were normally suppressed by a predominance of *Aspergillus* and *Penicillium* spp. Of four physiological groups of bacteria studied the nitrifiers and cellulose decomposers were reduced most severely in numbers by methyl bromide. The actinomycetes showed a greater tolerance of fumigation than either the fungi or bacteria. *Fusarium* spp. were the most resistant fungi, followed by *Trichoderma*, *Thielavia*, and *Chaetomium*.

Burges (A.) & Fenton (Enid). **The effect of carbon dioxide on the growth of certain soil fungi.**—*Trans. Brit. mycol. Soc.*, 36, 2, pp. 104–108, 2 graphs, 1953.

Penicillium nigricans, *Gliomastix convoluta*, *Zygorrhynchus vuillemini*, and other fungi isolated from Breckland soils in East Anglia [*R.A.M.*, 29, p. 532] were grown in atmospheres containing various amounts of carbon dioxide, growth being determined by measuring both the linear spread and the dry weight of the mycelium. An increase in the carbon dioxide concentration to above 5 per cent., as occurred shortly after rain, greatly inhibited *P. nigricans* (a species restricted to the upper 5 cm. of soil [cf. loc. cit.]) but had far less effect on *Z. vuillemini*, which abounds below 10 cm. *G. convoluta*, which occurs throughout the profile, was intermediate in its reaction. In view of the high concentration of carbon dioxide found in soil after rain (3·5 to 9·2 per cent.), it would appear that the vertical distribution of soil fungi is determined by tolerance of carbon dioxide rather than low oxygen [cf. 14, p. 791].

Stevenson (I. L.) & Rouatt (J. W.). **Qualitative studies of soil microorganisms XI. Further observations on the nutritional classification of bacteria.**—*Canad. J. Bot.*, 31, 4, pp. 438–447, 1 pl., 1953.

As a further contribution to this series [cf. *R.A.M.*, 27, p. 41] a comparative study was made at the Department of Agriculture, Ottawa, of two nutritional

schemes of bacterial classification [*Soil Sci.*, 55, pp. 185–195, 1943] to establish the validity of Taylor's suggested improvements [*Proc. Soc. appl. Bact.*, 14, pp. 101–111, 1951]. Grouping by both methods was found to be basically similar.

MAJUMDER (S. K.) & SEN (N. K.). **A new method of isolating antagonistic organisms from soil.**—*Sci. & Cult.*, 19, 2, pp. 104–105, 2 figs., 1953.

It has been noticed during soil isolations at the Indian Institute of Technology, Kharagpur, that antagonism between soil micro-organisms can be detected by direct observation on the soil-starch plates suggested by Winogradsky (*Ann. Inst. Pasteur*, 40, p. 455, 1926). The organisms causing inhibition zones can then be picked out. The use of different nutrient solutions, such as mannitol, potato dextrose, and nutrient broth, in place of starch assists in detecting inhibition zones.

BERNAUX (P.). **Contribution à l'étude de la rouille du Carthame (Puccinia carthami Corda).** [A contribution to the study of Safflower rust (*Puccinia carthami* Corda).]—*Bull. Soc. mycol. Fr.*, 68 (*1952*), 3, pp. 327–351, 16 figs., 1953.

In a study of safflower rust (*Puccinia carthami*) [*R.A.M.*, 32, p. 278] made at the National School of Agriculture, Montpellier, in 1951 plants of a number of varieties were grown from infected seed in ground not previously bearing the crop. Infection of the hypocotyl [31, p. 632] caused wilting and collapse of the plants through secondary invasion of the tap-root. Affected hypocotyls bore uredo- and teleutosori, but no pycnia; mycelium developed in the cortical parenchyma and penetrated to the phloem. New roots developing from the hypertrophied hypercotyl were usually inadequate; further, the mycelium spread above the zone of root emergence and so killed the plant.

Uredo- and teleutospores appear to be held on the surface of the fruit by the ornamentations, by the cottony hairs of the fruit scar, and by the rugosity of the flower scar. On emergence the hypocotyl rubs against the fruit scar and infection occurs. In addition, the valves of the fruit remain for some time in contact with the cotyledons, which are often damaged by them; this also favours infection.

During these observations, round, translucent leaf spots appeared towards the end of May, each surrounded by a brown band and with a uredosorus at the centre. The mesophyll tissues were destroyed and the spaces filled with bacteria, but the sorus continued to emit spores. Several spots sometimes coalesced, became necrotic, and were invaded by saprophytes, especially *Alternaria* spp. Development of the spots was arrested in hot, dry weather. The bacterial infection, confined to the lower leaves, appeared to have resulted from splashes of mud. Progress of the rust away from the base of the plant was very slow; the bracts were not attacked until 26th June.

Seed disinfection is recommended for the control of hypocotyl infection; against infection from the soil a rotation of several years' duration is advised.

BAXTER (J. W.) & CUMMINS (G. B.). **Physiologic specialization in Puccinia menthae Pers., and notes on epiphytology.**—*Phytopathology*, 43, 4, pp. 178–180, 1953.

The results of a study at the Department of Botany and Plant Pathology, Purdue University, Lafayette, Indiana, on physiologic specialization in *Puccinia menthae* demonstrated the existence of at least 15 races within the species in North America. In addition to the species of Labiatae already recorded as susceptible to one or more of the races attacking cultivated mints [*R.A.M.*, 32, p. 644], *Satureja hortensis*, *S. douglasii*, *Hedeoma hispida*, and *H. drummondii* reacted positively to infection in the present series of experiments, while the P. 13 strain of spearmint (*Mentha spicata*) proved to be immune from all 15.

Field observations in northern Indiana in 1951 showed that aecidia of *P. menthae*

may be found on cultivated spearmint as early as 15th April and as late as 15th June, while 5th May was the earliest date for their detection on escaped plants of *M. spicata*. Underground aecidial lesions occurred on stems and rhizomes at depths between ½ and 6½ in. below soil-level. On the basis of these findings deep autumn ploughing, elimination of exposed plant refuse, and destruction of neighbouring wild or escaped hosts are suggested as control measures.

Bouriquet (G.). **Les principales maladies de la Canne à Sucre dans les territoires et départements français d'outre-mer.** [The principal diseases of Sugar-Cane in French territories and provinces overseas.]—*Agron. trop.*, 8, 4, pp. 346–353, 10 figs., 1953.

Brief, semi-popular notes are given on the symptoms, causal organisms, manner of spread, damage caused by, and control of the chief diseases of sugar-cane present in the French overseas possessions. The diseases dealt with include mosaic virus [*R.A.M.*, 10, p. 490], present in Madagascar, leaf spot (*Leptosphaeria sacchari*) [15, p. 606; 29, p. 123], rust (*Puccinia kuehnii*) [C.M.I. map No. 215], leaf scald (*Phytomonas* [*Xanthomonas*] *albilineans*) [No. 33], pineapple disease (*Ceratostomella* [*Ceratocystis*] *paradoxa*) [No. 142] in Madagascar, Réunion, and Indo-China, smut (*Ustilago scitaminea*) [No. 79], *Coniothyrium* [*Pleocyta*] *sacchari* in Madagascar [*R.A.M.*, 17, p. 839] and Indo-China, *Colletotrichum falcatum* [*Physalospora tucumanensis*: C.M.I. map No. 186], and foot rot due to *Dictyophora multicolor* in Madagascar [*R.A.M.*, 17, p. 839] and *Marasmius sacchari* in Guadeloupe [4, p. 313]. *M. sacchari* appears to be only a wound parasite; if the soil is severely infested several years' rotation should be practised.

Mungomery (R. W.). **The Division of Entomology and Pathology.**—*Rep. Bur. Sug. Exp. Stas Qd* 52, pp. 39–46, 1 pl., [? 1952].

In this report [cf. *R.A.M.*, 31, p. 352] the author states that the presence of reddish vascular bundles appears to be a fairly accurate indication of ratoon stunting disease [32, p. 645], and has shown that it was more widespread in the varieties Q.28, Q.45, P.O.J.2878, Q.813, E.K. 28, M.1900 Seedling, H.Q.426, Badila, and Trojan than was hitherto suspected, being present in all districts from Proserpine to Rocky Point and in the far north. C.P. 29/116 and Q.50 were infected by inoculation with diseased sap. Heat treatments [loc. cit.] cured the disease in Q.28 crops, which remained healthy for three years. The widespread occurrence of the disease, which has probably been present for a number of years and may have been responsible for the gradual and sometimes rapid deterioration of certain varieties in the past, is disturbing and the clean 'seed' campaign should be continued in every district where the disease is found.

Little change was observed in the Fiji [virus] disease situation [31, p. 352]; there was a slight reduction in the number of stools rogued. Most of them were found in C.P.29/116 which covers 2,997 acres of the 3,825 inspected this season.

A *Sclerospora* disease [cf. 32, p. 591], quite distinct from downy mildew (*S. sacchari*), which developed suddenly and widely, is believed to have resulted from the 1950–1 floods. It was prevalent on Q.42 at Maryborough and C.P.29/116, Pindar, Q.42, Q.47, Q.50, and Trojan at Moreton. Infection was heaviest in one acre of first ratoon Trojan. On the basis of the oogonial stage and infection on both sugar-cane and sorghum the fungus is nearest to *S. macrospora* [32, p. 631]. This season again not a single stool infected with *S. sacchari* [32, p. 278] was recorded anywhere in the State.

Sugar-cane mosaic [virus: 31, p. 352] was well checked in the Mackay and Bundaberg districts by roguing and the use of clean 'seed'. Because of heavy weed growth the river lands of the latter and similar areas at Maryborough and Moreton

remain infection pockets of the disease. The difference in yield between healthy and diseased setts [cf. 32, p. 644] at Moreton was significant at the 5 per cent. level in Q.28 and at 1 per cent. in Q.42.

Spraying against yellow spot (*Cercospora kopkei*) with Bordeaux mixture and lime-sulphur hindered the development of the disease, though the latter (1 in 50, 22 per cent. polysulphide preparation) caused some leaf damage to mature Trojan even in the cooler autumn months.

Leaf scald (*Xanthomonas albilineans*) was observed for the first time after 20 years in South Queensland in the Moreton mill area on the Trojan variety. Chlorotic streak virus remains confined to the far northern mill areas, and to the southern districts of Maryborough, Moreton, and Rocky Point.

Bernaux (P.). **Contribution à l'étude de la pathologie végétale méditerranéenne.** [A contribution to the study of plant pathology in the Mediterranean.]—*Rev. Mycol.*, 17, 2, pp. 109–140, 2 pl. (after p. 192), 1952.

This paper, divided into two parts, one dealing with plant pathology and pedology and the other with plant pathology in relation to various human activities, is based on the author's observations over a period of five years in the Mediterranean regions of France [see next abstract]. The points made are illustrated by references to local diseases. He considers that two main types of saprophytic phase for plant parasites may be distinguished, a latent phase, as for example, when a fungus overwinters in spore form on fallen leaves but during this time does not develop, and an active phase, during which the fungus continues to grow. In Mediterranean France the presence of numerous evergreen trees and shrubs raises its own problems, the saprophytic phase of fungi attacking such plants not always being related to the season. For example, infection of *Phillyrea angustifolia* by *Zaghouania phillyreae* [*R.A.M.*, 13, p. 716] causes leaf fall and the disease is transmitted from the fallen leaves to the basal attached leaves in early winter. The saprophytic phase is latent and short-lived.

The phytopathology of eroded areas is discussed.

Dealing with the activities of man in relation to crop diseases the author describes the effects of forest fires, the grazing of sheep, the abandonment of cultivated ground, and the introduction of disease on seed from abroad. Recent attempts to grow cotton in Languedoc have led to the introduction there of *Fusarium vasinfectum* and *Alternaria macrospora*.

Bernaux (P.). **Notes de pathologie végétale méditerranéenne, II.** [Notes on plant pathology in the Mediterranean, II.]—*Bull. Soc. mycol. Fr.*, 68 (*1952*), 4, pp. 386–399, 4 figs., 1953.

This annotated list of fungi collected in 1951 and 1952 in northern localities of the Mediterranean region of France [cf. *R.A.M.*, 31, p. 209 and preceding abstract] includes the pycnidial state of *Fabraea maculata* [26, p. 285 and next abstract] on *Amelanchier ovalis* at La Malou, Hérault, *Coleosporium inulae* on *Pinus halepensis* [30, p. 382] at Grabels, Hérault, and *Melampsora lini* [C.M.I. map No. 68] on *Linum strictum* at Fournes, Gard.

Da Camara (E. de S.) & De Vasconcelos (A. T.). **Fungi Lusitaniae III.** [Fungi of Portugal III.]—*Agron. lusit.*, 14, 4, pp. 249–257, 1 pl., 1952.

Included in this further list of Portuguese fungi [cf. *R.A.M.*, 32, p. 592] are two new species, *Uromyces pisi* on peas, *Puccinia cichorii* f. *longipes* on chicory [cf. 20, p. 596], *P. graminis* on *Agrostis alba* [cf. 30, p. 630], *Entomosporium maculatum* [*Fabraea maculata*: see preceding abstract] on *Cydonia oblonga* [29, pp. 141, 160, *et passim*], and *Epicoccum neglectum* on rice [29, p. 530].

Brien (R. M.) & Dingley (Joan M.). **First supplement to 'A revised list of plant diseases recorded in New Zealand' 1949–51.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 6, pp. 556–562, 1953.

This supplement of diseases recorded in New Zealand [cf. *R.A.M.*, 32, p. 646] contains a list of 68 fungus, virus, and bacterial diseases, 15 of them being new records, on 98 host plants. The presence of *Helicobasidium purpureum* [C.M.I. map No. 275] has been established. The new records include *Alternaria brassicae* and *Cercosporella brassicae* on turnip, *Septoria chrysanthemella* on *Chrysanthemum morifolium*, *Uromyces appendiculatus* on bean (*Phaseolus vulgaris*), and *Sphaceloma* on violet (*Viola odorata*).

Kawatani (T.). **Hosts of Claviceps.**—*Bull. nat. hyg. Lab., Tokyo*, 70, pp. 127–152, 1952. [Japanese.]

Twenty-three species of *Claviceps* [*R.A.M.*, 32, p. 565] are listed with 332 known hosts (Latin binomials with authors and dates), of which 74 are found in Japan.

Steyaert (R. L.). **New and old species of Pestalotiopsis.**—*Trans. Brit. mycol. Soc.*, 36, 2, pp. 81–89, 6 figs., 1953.

Continuing his monographic study of the genus *Pestalotiopsis* [cf. *R.A.M.*, 28, p. 489], the author describes and annotates 15 species, including three new ones and one new variety. Two new combinations are made.

Loos (C. A.). **Report of the Pathologist for the year 1951.**—*Bull. Tea Res. Inst. Ceylon* 33, pp. 38–42, 1953.

Some of the information in this report [cf. *R.A.M.*, 32, p. 454] has already been noticed from other sources [loc. cit. and 31, p. 517]. Weather conditions during the year were unfavourable to the build-up of blister blight infection [*Exobasidium vexans*: see next abstract]. The crop returns in the five-plot Kataboola loss of crop experiment are now revised up to 1st October, 1951 [32, p. 454]. Plots 2, 3, and 4 showed an increase of 129, 94, and 146 lb. made tea per acre over the unprotected plot 1, while plot 5 (also unprotected) showed a loss of 69 lb. The crop returns in the St. Coombs No. 9 Field Crop Protection experiment [31, p. 403] for the third year (up to 31st December, 1951) showed yield increases over the unsprayed plot of 229 lb. from bushes sprayed weekly with perenox (4 oz. in 10 gals. water at 12 gals. per acre) and 151 lb. for the plots sprayed fortnightly, the aggregate increases for the three years of the experiment being 498 lb. and 379 lb., respectively.

The returns for the No. 8 experiment showed an increase of 178 lb. on plot C and 323 lb. on plot B as compared with plot A (unsprayed) [30, p. 586] during the second year (1951), the respective totals for the two years being 342 lb. and 532 lb. per acre.

Portsmouth (G. B.). **The principles of bush management.**—*Tea Quart.*, 24, 1–2 (Conference number), pp. 17–20, 1953.

The fact that the vegetative propagation of selected, high-yielding, clonal plants undoubtedly offers the greatest possibilities of increasing tea yields cheaply and rapidly is amply illustrated by the figures from the St. Coombs 1947 (second year) series: clones Nos. 2024 (2,295 lb. tea per acre), 2025 (1,830), 2023 (1,685), 2022 (1,650), and 2021 (1,500), none of which was protected against blister blight [*Exobasidium vexans*: see preceding abstract]. No. 25, however, yielded only 1,405 lb., whereas prior to the advent of blight it yielded 1,270 lb. per acre in the first bearing year, 1,665 lb. in the second, and 2,295 lb. in the third.

JOHNSTON (A.). **Blister blight of Tea in Malaya. 3. Results of further spraying experiments.**—*Malay. agric. J.*, 36, 2, pp. 81–88, 1953.

The results of further spraying experiments against tea blister blight (*Exobasidium vexans*) [*R.A.M.*, 32, p. 105] carried out at the Agricultural Station, Tanah Rata, from May, 1951, to March, 1952, have shown that satisfactory control with reduced spraying costs can be obtained either by increasing the interval between sprays from 7 to 10 days or by cutting the strength of perenox by half (0·125 per cent.), when the addition of a wetting agent (lissapol) might be advantageous. Coppesan, koneprox, shell copper fungicide, and blitox were all as effective as perenox. Thiram (3 lb. per acre) was almost as good as perenox (6 oz.), but is not economically practicable.

WEBSTER (B. N.). **Mycorrhiza.**—*Tea Quart.*, 24, 1–2, pp. 26–30, 2 pl., 1953.

Following a general introduction on mycorrhiza and a reference to some classic examples and research work, the author summarizes the present knowledge of the tea endophyte, *Rhizophagus theae* [*R.A.M.*, 18, p. 470]. The observations that tea bushes appear to be unable to utilize nitrates and that old roots have poorly developed root hairs were supplemented by the discovery that about 75 per cent. of tea root samples in Ceylon carry a fungus internally. An outline is given of the plans for future investigations to determine its significance in relation to the tea bush and the means by which the latter may derive maximum benefit (if any) from the association.

SCHLEGEL (D. E.), GOLD (A. H.), & RAWLINS (T. E.). **Suppressing effect of radioactive phosphorus on symptoms and virus content of mosaic Tobacco plants.**—*Phytopathology*, 43, 4, pp. 206–209, 3 figs., 1 graph, 1953.

At the Department of Plant Pathology, University of California, Berkeley, radio-phosphorus (P^{32}) [*R.A.M.*, 30, p. 2] in young mosaic-infected tobacco leaves inhibited virus formation and symptom expression, assayed by the 'heat-ultra' method [32, p. 699]. P^{32} activity of about 100 and 200 counts per second per mg. fresh weight of leaf tissue reduced virus production to approximately a half and a quarter, respectively, of that in plants without radio-phosphorus. At levels of 200 counts and upwards P^{32} visibly arrested the terminal growth of stems and roots, but the expansion of formed leaves was less susceptible to its influence.

KLECZKOWSKI (A.). **A method for testing results of infectivity tests with plant viruses for compatibility with hypotheses.**—*J. gen. Microbiol.*, 8, 2, pp. 295–301, 1953.

At Rothamsted Experimental Station, Harpenden, Herts., a statistical method was devised for testing the compatibility between results of local lesion counts and hypotheses relating changes in infectivity of plant virus preparations to treatments applied to them. It involves establishing a relation between numbers of lesions and virus concentration for each experiment and a logarithmic transformation of lesion counts to make variance independent of the magnitude of the variate. When put into practice the method confirmed that inactivation of tobacco mosaic and Rothamsted tobacco necrosis viruses by ultra-violet irradiation [*R.A.M.*, 32, p. 469] is either a first-order reaction or closely allied thereto.

New wilt resistant Tobacco variety.—*Seed World*, 73, 4, p. 26, 1953.

A new, high-yielding, flue-cured tobacco, Dixie Bright 28, is announced by the U.S. Department of Agriculture and the North Carolina Station to be highly resistant to bacterial wilt [*Pseudomonas solanacearum: R.A.M.*, 32, pp. 119, 671]. In tests from 1949 to 1952 it outyielded the wilt-resistant varieties Dixie 27 and Oxford 26.

Anderson (P. J.) & Swanback (T. R.). **Fumigation of Tobacco soils in the seedbed and in the field.**—*Bull. Conn. agric. Exp. Sta.* 542, 23 pp., 10 figs., 1951. [Received 1953.]

A description is given of the methods employed at the Connecticut Agricultural Experiment Station for sterilizing tobacco seed-beds [cf. *R.A.M.*, 32, p. 589] by means of methyl bromide, chloropicrin, formaldehyde, and acetic acid, and also field soils. Notes are given on the effect of fumigation on the soil and cured tobacco and on certain conditions attached to fumigant application.

Strong (M. C.). **Fungicide combinations in tank-mix sprays for Tomatoes.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 35, 4, pp. 440–449, 2 figs., 1953.

In further tests at the Department of Botany and Plant Pathology, Michigan State College, in 1951 and 1952, for evaluating fungicide combinations [cf. *R.A.M.*, 32, p. 346] as tank-mix sprays against tomato anthracnose [*Colletotrichum phomoides*: loc. cit.], late blight [*Phytophthora infestans*: loc. cit.], early blight [*Alternaria solani*: 32, p. 119], and *Septoria* blight [*S. lycopersici*: 31, p. 303] five or preferably six sprays of insoluble copper fungicide plus ziram (mixed together in the spray tank), starting when the first cluster of fruit was set and then at 10-day intervals, gave satisfactory control and could be substituted for the alternating schedule of these two fungicides. Half the usual concentration of each fungicide is sufficient for the tank-mix, but the copper ingredient should be increased to its full strength (2 lb. metallic copper per 100 gals.) when late blight appears on the plants.

In 1951 the fungicides giving over 10 tons total yield per acre were tribasic copper sulphate (4 lb.), COCS (4 lb.), Robertson copper (2 lb., H. H. Robertson Co.), and cop-o-zinc (4 lb.), all plus zerlate (2 lb.) in tank-mix, and cop-o-zinc alone; the yield of the unsprayed was 5·6 tons. The other sprays used alone, also crag 658, copper carbamate, and dithane [D] 14 (plus zinc or manganese sulphate) with or without zerlate gave 7·9 to 9·5 tons. In 1952 the fungicides giving 10 tons or more total yield per acre were cop-o-zinc, tribasic, Calumet and Hecla copper (2¾ lb., Calumet and Hecla Consolidated Copper Co.), and Robertson copper (2·15 lb.), all plus zerlate in alternating schedule, Calumet and Hecla (1⅜ lb.), Robertson copper (1·07 lb.), tribasic (2 lb.), and cop-o-zinc, all plus zerlate (1 lb.) in tank-mix, COCS (3 lb.) alone and plus vancide 51ZW (1½ lb. tank-mix), the latter alone (2 lb.), and tribasic alone, the unsprayed yielding 6·5 tons.

Govindan (P. R.). **Induced toxicity and deficiency symptoms of zinc in Tomato.**—*Sci. & Cult.*, 19, 1, pp. 46–47, 1953.

An account is given of culture experiments carried out at the Plant Physiological Laboratory, Banaras Hindu University, on the part played by zinc in the growth of tomato plants. Symptoms of toxicity and deficiency [cf. *R.A.M.*, 31, p. 462] are described. Low concentrations of zinc (0·5 and 1 p.p.m.) were stimulating. Toxicity symptoms appeared at concentrations over 2 p.p.m.

Kidson (E. B.) & Stanton (D. J.). **'Cloud' or vascular browning in Tomatoes. I. Conditions affecting the incidence of 'cloud'. II. Some chemical characteristics of plant and soil in relation to susceptibility to 'cloud'.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 6, pp. 521–530; 35, 1, pp. 1–14, 4 figs., 1953.

'Cloud', a form of abnormal ripening of tomato fruits [*R.A.M.*, 28, p. 5] resembling 'blotchy ripening' [6, p. 60], has been causing serious losses in the unheated tomato houses of the Nelson district, New Zealand. During the last five years experiments at the Cawthron Institute have shown that the 'cloud' condition, believed to be of physiological origin, is increased by soil sterilization, heavy watering, raw organic manures, glucose, heavy defoliation, and excessive leaf growth.

Light watering, very heavy dressings of potassium (4 oz. per sq. yd.) during the winter, and frequent additional applications of nitrogenous fertilizers (12 oz. and 8·4 oz.), potassium, or calcium chloride (4 oz.) throughout the season proved beneficial in reducing the disorder and tended to produce a thinner-stemmed, less rank type of growth with slightly reduced weight of fruit per plant.

The condition is associated with low dry matter (organic constituents) in the fruit and leaves; treatments which alter these constituents also change the 'cloud' situation. The treatments which bring about amelioration may be acting on water uptake by the plant.

Dimond (A. E.) & Waggoner (P. E.). **The physiology of lycomarasmin production by Fusarium oxysporum f. lycopersici.**—*Phytopathology*, 43, 4, pp. 195–199, 3 graphs, 1953.

The physiology of lycomarasmin production [*R.A.M.*, 32, p. 269] was investigated at the Connecticut Agricultural Experiment Station, using Wellman's R–5–6 strain of *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* [19, p. 170; 32, p. 285]. A modified Richards's solution was inoculated and the culture filtrate analysed, the lycomarasmin being estimated by the reaction of tomato cuttings and identified through its known activation by iron [32, p. 347] and inactivation by heating.

The maximum mycelial weight was reached within the first six weeks, during which period reducing sugars were exhausted, nitrate- and ammonia-nitrogen were utilized as far as possible without the addition of further carbohydrate, and the pH and polysaccharide levels became stabilized. Lycomarasmin toxicity, however, was not observed until the end of the sixth week. Its titre then rose with the falling mycelial weight. Lycomarasmin would thus appear to be a product of lysis rather than of rapidly growing mycelium, but if it is a lytic product *in vivo* as well as *in vitro*, foliar symptoms would be expected to appear in naturally infected tomato plants later than is actually the case.

Ludwig (R. A.). **Studies on the physiology of hadromycotic wilting in the Tomato plant.**—*Tech. Bull. MacDonald agric. Coll.* 20, 39 pp., 10 figs., 1952.

In this detailed study of tomato wilt (*Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici*) [*R.A.M.*, 31, p. 581; 32, p. 700, and preceding abstract] in relation to the physiological processes of the host, wilting could not be attributed to either an excessive increase in transpiration or an impaired ability to absorb, but appeared to result from an interference with conduction. The rate of water flow through excised tomato stem segments was found to be governed by the same factors as those affecting the rate of flow through tubes. An increased resistance to flow in the stems of diseased plants could not be attributed entirely to the reduced number and size of the conducting vessels. In living transverse sections of diseased plants homogeneous hyaline material was discovered in the vessels and this appeared to be responsible for wilting.

Purdy (L. H.) & Bardin (R.). **Mode of infection of Tomato plants by the ascospores of Sclerotinia sclerotiorum.**—*Plant Dis. Reptr*, 37, 6, pp. 361–362, 2 figs., 1953. [Multilithed.]

In September, 1952, many tomato plants in the Salinas area, California, were found to be affected by *Sclerotinia sclerotiorum* [*R.A.M.*, 31, p. 543], lesions usually occurring 1 ft. or more above the soil. Field observations and laboratory inoculations indicated that ascosporic infection under natural conditions takes place only through dead tissue, here dead flower parts.

Natti (J. J.). **Symptoms produced on Tomato by Potato leafroll virus.**—Abs. in *Phytopathology*, 43, 2, p. 109, 1953.

Leaflets of John Baer tomato plants, 3 to 5 in. in height, produced after inoculation in the greenhouse [at an American experiment station] with potato leaf roll virus by means of aphids, developed stunting and chlorosis at the end of a fortnight. With continuing growth the severity of the symptoms increased progressively towards the tips of the plants, which assumed a spindly appearance from the drastic reduction in leaflet size. The margins of the leaflets, curling downwards at first, began to roll upwards about 20 days after inoculation, and with advancing maturity they acquired a leathery texture and displayed intervenal chlorosis and anthocyanosis. The fruits of infected plants tended to be scanty and of irregular shape. Necrotic areas in the primary phloem of infected plants reacted positively to phloroglucinol.

Bibliographie des ausländischen forst-und holzwirtschaftlichen Schrifttums. Folge 5. [Bibliography of the foreign literature relating to forestry and timber exploitation. Series 5.]—*Mitt. BdAnst. Forst-u. Holzw.* 28, 256 pp., 1952. [Mimeographed.]

Included in this bibliography of the literature on forestry and timber exploitation published in countries other than Germany in 1951–2 are a number of contributions dealing with lignicolous fungi, timber preservation, and other aspects of forest pathology.

Potlaichuk (V. I.). Вредная микофлора желудей и ее развитие в зависимости от условий произрастания и хранения. [Harmful mycoflora of acorns and its development in relation to the conditions of growth and storage.]—Бот. Журн. [*J. Bot. U.S.S.R.* = *Bot. Zh. S.S.S.R.*], 38, 1, pp. 135–142, 1953.

An investigation was carried out in the U.S.S.R. into the influence of developmental conditions and storage on the fungus parasites of oak acorns in the European part of the Union. Among the most numerous and widespread moulds detected on the fruit surface or penetrating the outer tissues were species of *Mucor*, *Rhizopus*, *Trichoderma*, *Botrytis*, and *Penicillium*, all of which are of secondary importance in connexion with germination losses. *Sclerotinia pseudotuberosa* [*Ciboria batschiana: R.A.M.*, 16, p. 425; 28, p. 547], *Phomopsis quercella*, *Gloeosporium quercinum* [*Gnomonia quercina*: 32, p. 42 and next abstract], and *Cytospora* [*Valsa*] *intermedia* [21, p. 272] were the most harmful, penetrating and destroying the embryonic tissues and under unfavourable storage conditions becoming widespread and destructive. Acorns should be examined carefully before storage. For reforestation purposes those from the most favourable regions for growth, where they are healthiest, should be used.

Fergus (C. L.). **Relation of weather to the severity of White Oak anthracnose.**—*Phytopathology*, 43, 2, pp. 103–105, 1953.

During the period from 1950 to 1952, inclusive, the factor most closely related to severity of anthracnose (*Gnomonia veneta*) [*G. quercina*] on white oak [*Quercus alba*] at and near Pennsylvania State College [*R.A.M.*, 30, p. 252] was the number of days and hours of rain during late April and May, when the buds were opening and the leaves expanding [cf. 30, p. 393]. Thus, the disease indices for the area in 1950, 1951, and 1952 were 37, 14, and 43, respectively, corresponding to 111, 63, and 122 hours with 0·01 in. or more rain, 19, 15, and 23 days with 0·01 in. rain, and total rainfalls of 5·59, 3·69, and 6·31 in., respectively during the critical period. In 1952 infection was more extensive in a park where leaves and twigs were raked and removed than under natural forest conditions.

Trees and farm woodlots.—*Rep. Ia agric. Exp. Sta., 1949–1951* (Part II), pp. 19–21, 7 figs., 1951.

The best control of 'sycamore' [*Platanus occidentalis*] anthracnose [*Gnomonia platani*: *R.A.M.*, 32, p. 649] was obtained in Iowa during 1949 and 1950 by spraying with Bordeaux mixture, followed closely by tribasic copper sulphate (4 lb. per 100 gals. water), phygon ($\frac{3}{4}$–100), and puratized agricultural spray (1 pt.–100), all applied with a spray gun at 600 lb. pressure. Another experiment demonstrated that of all the single or combined spray treatments puratized applied during dormancy and at bud-burst gave the best control.

If neither severing the root connexions nor trenching is practicable for the control of oak wilt (*Chalara quercina*) [32, p. 110] its spread may be arrested by removing all healthy trees for a radius of 25 to 50 ft. from the source of infection. Control was also secured by poisoning trees within this zone with ammate (8 lb. per gal.) or sodium arsenite injected into holes drilled or cut in the base of the tree or by spraying a 12-in. band around the bases, during early season growth only, with 2,4-D or 2,4,5-T (one part to one of kerosene, fuel oil, or diesel oil) at a rate of about 10 per cent. active ingredients. Of further methods being investigated, the application of certain chemicals to root feeding zones through soil injection needles has retarded the progress of the disease and, when developed further, should prove useful in saving oaks having a high individual value.

Editorial notes. Sooty disease of Sycamore.—*Quart. J. For.*, 47, 2, pp. 83–84, 1 col. pl., 1953.

Localities from which sooty disease of sycamore caused by *Cryptostroma corticale* [*R.A.M.*, 32, p. 109] has not previously been reported [cf. 30, p. 552] include Thetford, Norfolk, and Henley, Oxfordshire, but it did not appear to be damaging the trees. It has also been recorded at Grenoble, France [32, p. 221]. Field and Norway maples [*Acer campestre* and *A. platanoides*] as well as sycamore are attacked.

Welch (D. S.). **The Dutch Elm disease in urban and forest areas.**—*J. For.*, 51, 9, pp. 641, 643–644, 1953.

Studies at Cornell University, Ithaca, New York, on Dutch elm disease (*Ceratostomella ulmi*) [*R.A.M.*, 32, p. 521] have shown that when elms are cut they are immediately invaded by bark beetles (*Scolytus multistriatus* and *Hylurgopinus rufipes*), coming from considerable distances. Control by timely removal of diseased trees and other beetle-breeding wood is practicable only if the lumber and landscape value justify the cost. Otherwise, in forest areas where the disease becomes established the prompt destruction of all valuable elm in the immediate vicinity is necessary to avoid a complete loss in the rest of the stand, which should be utilized as soon as possible as no practical protection of timber under such conditions is known.

Bagchee (K.). **The fungal diseases of Sal (Shorea robusta Gaertn.) Part 1.**—*Indian For. Rec.*, N.S. Mycol., 1 (*1951*), 2, pp. 11–23, 3 pl., 1953.

This is the first of a series of publications on the results of investigations carried out during the past 15 years on diseases of sal (*Shorea robusta*) in India [cf. *R.A.M.*, 32, pp. 158, 525]. A list of 150 species of fungi attacking sal is given in an appendix (pp. 19–22). Seedlings are not affected by damping-off. Among the parasites are two species of *Cercospora*, *Macrophoma shorea* n. sp., *Asterina* sp., *Capnodium* spp., *Meliola* sp., *Xylaria tuberosa* and *X. polymorpha* [cf. 18, p. 356] causing root and collar rot, *Marasmius gordipes* (horse-hair blight), and *Polyporus* sp. (thread blight).

Macrophoma shorea n. sp. is not very widespread, about six collections having been made from 70- to 80-year-old trees. The fungus penetrates through hailstone

injuries into the smaller branches, which sometimes curve from the spot where cankers form. The leaves on infected twigs are thicker, heavier, and round instead of oval. In culture the fungus produced a semi-flocculent mat with a slightly raised rim, the mycelium turning greyish or smoky brown and later black. The hyphae segmented into hyaline, unicellular spores 2·5 by 1·5 μ. Pycnidia, developing after two weeks, measured 200 to 350 by 150 to 250 μ, and the hyaline pycnidiospores 16 to 20 by 5 to 7·5 (mean 18·5 by 6) μ. The optimum temperature for growth was 30° C., the minimum 18°, and the maximum 42°.

Six weeks after wound inoculation of potted sal seedlings the bark adjoining the wound became discoloured and cracked; the tissues sank along the advancing margin of the fungus, and the canker extended along the twig without girdling it. Pycnidia were formed along the edge of the canker after 18 months.

Crandall (B. S.). **Notes on the fungus causing wilt of Calophyllum in El Salvador, Central America.**—*Plant Dis. Reptr*, 37, 6, p. 367, 1953. [Multilithed.]

A cultural comparison by Dr. M. B. Schol-Schwarz at the Centraalbureau voor Schimmelcultures, Baarn, Holland, of the fungus causing wilt of *Calophyllum brasiliense* var. *rekoi* in El Salvador [*R.A.M.*, 29, p. 183] with *Haplographium calophylli* [28, p. 651] has shown them to be identical; the Central American disease is, therefore, considered to be caused by *H. calophylli*. Inoculation experiments indicated that *C. calaba* and *C. inophyllum*, grown from seed imported from Puerto Rico, were less susceptible than the native El Salvador variety.

Denyer (W. B. G.). **Cephalosporium canker of Western Hemlock.**—*Canad. J. Bot.*, 31, 4, pp. 361–366, 1 pl., 1953.

A stem canker of suppressed western hemlock (*Tsuga heterophylla*) caused by *Cephalosporium* sp. [cf. *R.A.M.*, 16, p. 847] was found at Powell River and Turnour Island, British Columbia. Healthy *T. heterophylla* inoculated with the fungus developed cankers, similar to those of natural origin, up to a maximum of 1·5 by 6·0 in. in five months, resinosis being always present. The fungus grew slowly on malt agar forming a white farinaceous mat with hyaline droplets, becoming yellow, subfelty in the older parts, and with a bayed, hyaline, oppressed margin. The unicellular conidia are oval to obovate, occasionally cylindrical, hyaline, 2·4 to 4·5 by 4·1 to 6·7 μ. The phialides taper slightly and are 2·3 to 3·0 μ at the base, 14 to 28 μ in length. The minimum, optimum, and maximum growth temperatures were 0 to 4° C., 18° to 20°, and 25° to 30°, respectively. In contrast to the *Cephalosporium* from balsam fir [loc. cit.] no sterigmata occurred on the tips of the conidiophores. The conidia were produced within the conidiophore tip and extruded one at a time. On the grounds of these differences the two fungi are considered to be distinct species.

The disease has been found in two widely separated localities on poor sites and does not cause death of the trees. It may be controlled by thinning dense stands to increase vigour.

Hubert (E. E.). **A study of recently killed trees in the Western White Pine type.**—*J. For.*, 51, 9, pp. 624–627, 1 fig., 1953.

A study of western white pine (*Pinus monticola*) and associated species in Idaho was carried out from 1949 to 1952, inclusive, to determine the agencies other than pole blight [*R.A.M.*, 32, p. 409] responsible for recently killed trees in pole blight areas. Field records indicate that *Armillaria mellea* [30, p. 131] is the most prevalent and abundant in all areas, being present on all tree species, particularly white pine, and on 67·1 per cent. of the dead trees. Although it has not been proved by controlled tests that the fungus can parasitize conifers in this area by direct

attack on living roots, its development on living bark, the evident girdling action upon a heavily infected tree, the sudden death of the tree, and its very common occurrence on trees of all ages all suggest some form of parasitic attack. *Poria subacida* was recorded in 3·5 per cent. of the dead trees. Many of the isolates from heavily blue stained areas of the collar and roots of the dead trees belonged to species of *Leptographium* found in both the northern (pole blight) areas and the southern, non-pole-blight stands.

Morris (C. L.). **Chemical control of Hypoderma lethale on Pitch Pine.**—*Plant Dis. Reptr*, 37, 6, pp. 368–370, 1953. [Multilithed.]

In field trials near Pine Grove Furnace, south-eastern Pennsylvania, in 1951 and 1952 for the control of the needle cast of pitch pine (*Pinus rigida*) caused by *Hypoderma lethale* [*R.A.M.*, 32, p. 525] both puratized agricultural spray (1 and 2 pints in 100 gals. water) and a fixed copper spray containing 12·75 per cent. copper as basic copper sulphate (16 lb.) gave excellent results when applied at fortnightly intervals throughout the growing season; a few applications of the former (2 pints) during the heaviest infection period in the middle two weeks of June were also effective. The full-schedule copper spray caused appreciable stunting of newly emerging needles, but had no serious effect on general vigour. Foliage on sprayed trees was retained, on an average, eight months longer than on those heavily infected the previous year.

Basham (J. T.), Mook (P. V.), & Davidson (A. G.). **New information concerning Balsam Fir decays in eastern North America.**—*Canad. J. Bot.*, 31, 3, pp. 334–360, 10 pl., 1953.

Four separate investigations of decay in balsam fir (*Abies balsamea*) [*R.A.M.*, 32, pp. 518–521] carried out from 1948 to 1950 in New Brunswick, Maine, and Ontario, some of the results of which have already been recorded [loc. cit.], demonstrated that existing conceptions of the causal organisms require considerable revision. The incidence of decay was greater on mixed wood slopes than on softwood flats [19, p. 445]. The distribution in relation to site is described, also the extent and type of decay with which each of the nine predominant heart rot fungi is associated.

Henderson (F. Y.). **Report of the Director of Forest Products Research for the year 1951.**—*Rep. For. Prod. Res. Bd, Lond., 1951*, pp. 31–35, 8 pl., 6 figs., 1953.

In this report [cf. *R.A.M.*, 31, p. 262] the results are given of work on the physiology of wood-rotting fungi which show that prolonged soaking of coniferous timber in water has little effect on its resistance to decay. A new compound, ungulinic acid, with antibiotic properties, has been isolated from the metabolic products of *Polyporus benzoinus*. Various synthetic resin finishes on wood blocks were not effective in preventing attack by [unspecified] fungi. For the control of fungi causing sap stain, phenyl mercury acetate was more effective than ethyl mercury phosphate [see next abstract].

Samples of fire hose fabric were so weakened after 16 days on cultures of *Chaetomium globosum* at 30° C. that they fell to pieces. Laboratory experiments showed that *C. globosum* also causes rapid decay of beech wood containing added inorganic nutrients. Attack is slower when no nutrients are added. Softwood is attacked only slightly by this organism. The type of fungal breakdown found in water-cooling towers [loc. cit.] occurs in other materials of economic importance, e.g., in alder and birch plywood stored in damp conditions and non-durable hardwoods imported from the tropics. A number of ascomycetes and fungi imperfecti isolated in South Africa from treated hardwood in contact with the ground have

been studied and six out of 20 were found to decay beech wood in a manner similar to *C. globosum* [see above, p. 43].

During laboratory wood block tests with preservatives it was found that optimum moisture conditions for the test fungi develop in bottles closed with a metal or plastic screw-on cap in which a $\frac{1}{2}$ in. hole has been drilled and then stoppered with cotton wool. Many outbreaks of dry rot [*Merulius lacrymans* and other fungi: 32, p. 599 and below, p. 62] could be traced either to the use of unseasoned timber which was covered with an impervious material before it had time to dry out, or to inadequate damp-proof courses in solid floors.

Verrall (A. F.) & Mook (P. V.). **Research on chemical control of fungi in green lumber, 1940–51.**—*Tech. Bull. U.S. Dep. Agric.* 1046, 60 pp., 9 figs., 1951. [Received July, 1953.]

During extensive tests carried out by the United States Bureau of Plant Industry from 1940 to 1951, no new chemicals were found that combined fungicidal effectiveness and other desirable qualities needed for use in protecting green lumber [see next abstract], mostly sweet gum (*Liquidambar styraciflua*) and southern yellow pine (*Pinus* spp.), during air-seasoning [*R.A.M.*, 24, p. 437; 29, p. 548]. Among commercial products, only those containing sodium pentachlorophenate (dowicide G and santobrite), sodium tetrachlorophenate, or ethyl mercury phosphate (lignasan) [see preceding abstract], alone or mixed with borax, prevented moulding and staining in small-scale tests. The results indicated that even with the most effective treatments, lumber should not be left in close piles. The interval between sawing and treating should not be longer than 24 hours in the summer and 48 in the winter. The greatest need for protection of treated lumber from rainwash is immediately after dipping at the green chain.

The mixtures and commercial products were also tested in the Pacific Northwest for treatment of close piled western coniferous wood. The protection in these tests lasted for much longer periods than in the south, because of differences either in the fungus floras or in climatic factors.

Verrall (A. F.). **Green lumber.**—Reprinted from *Amer. Forests*, 1 p., 1953.

This brief article stresses the need for treating timber when it is freshly cut to prevent fungal attack, and outlines methods for doing so [see preceding abstract]. These comprise kiln-drying and chemical treatment by dips or sprays.

Kaufert (F. H.), Hossfeld (R. L.), Rees (L. W.), & Neetzel (J. R.). **A small vacuum treating plant.**—*J. For.*, 51, 5, pp. 366–367, 1 diag., 1953.

A description is given of a small, inexpensive (not above $6,000), vacuum process, easily operated plant, developed by the School of Forestry, University of Minnesota, for treating timber against decay [see preceding and next abstracts]. The treating tank of arc-welded, 12-gauge steel with interior wood framing accommodates 100 3-in. fence posts or 1,000 board ft. of lumber per charge. The best results are obtained when the moisture content of the wood does not exceed 25 per cent. So far, treatment of pine wood has been very successful, but further studies are needed on timber more difficult to treat.

Colleary (M. J.). **The preservative treatment of fence-posts by non-pressure processes.**—*Bull. Can. Dep. Resources and Developm.* 107, 28 pp., 7 pl., 1952.

Owing to the shortage of eastern cedar [*Thuja occidentalis*] it has become necessary in Canada to use much less durable timbers for fence posts. Various preservatives and application methods are discussed and descriptions are given of the preparation of the timber and methods suitable for use on farms [*R.A.M.*, 32,

pp. 411, 527]. The increases of service life to be expected from the different preservatives and treatments recommended are tabulated, together with the associated costs.

JOHNSON (R. A.). **Preservation research on harbour structures. I, II, and III.** Reprinted from *Commonw. Engr*, 24 pp., 9 figs., 1952.

Control methods adopted by the Maritime Services of New South Wales for the prevention of fungal decay in new timber of harbour structures are outlined in the second paper in this series. The most economical toxin is coal-tar creosote. Other materials in use are copper salts and pentachlorophenol. In addition to the use of fungicides, design of timber structures is important, since decay fungi flourish in an ill-ventilated, close atmosphere. Frequent examination of timber structures is advised to arrest decay at an early stage.

JACQUIOT (C.) & LEAUBIE (Mlle M.). **Nouvelles expériences relatives à l'action de la conservation sous l'huile minérale sur l'activité de quelques espèces de champignons lignicoles.** [New experiments relative to the action of preservation under mineral oil on the activity of some species of wood-inhabiting fungi.]—*Rev. Mycol.*, 17, 2, pp. 168–170, 1952.

When cultures of *Stereum hirsutum*, *Ungulina fomentaria* [*Fomes fomentarius*], and *Coriolus* [*Polystictus*] *versicolor* from beech, *Lenzites* [*Daedalea*] *quercina* from oak, *Phellinus* [*Polyporus*] *fulvus* from wild cherry, *Xanthochrous* [*Fomes*] *pini*, *Poria vaillantii*, and *Trametes* [*Lenzites*] *trabea* from *Pinus sylvestris*, and *Pleurotus serotinus* from poplar were preserved for six or seven months under mineral oil and then used to inoculate test blocks, loss of weight of the blocks after four months was, respectively, 18·2, 6·8, 27, 3·7, 57·6, 2·3, 0, 6·5, and 2 per cent., the corresponding figures for the same fungi kept by ordinary methods being 12·3, 2·4, 21·6, 2·8, 44·4, 3·6, 3, 8·8, and 2·2 per cent. All the fungi producing white rots appeared to be stimulated by preservation under oil, while of those producing cubical rots *L. trabea* and *Poria vaillantii* were inhibited and *D. quercina* was stimulated. Further work is in progress.

MACK (G. W.) & SAVORY (J. G.). **A new treatment for walls infected with dry rot.**—*Builder*, 782, 5706, pp. 975–977, 2 figs., 1952.

A method is described for the application of a fungicidal paint or plaster to walls containing timber infected with *Merulius lacrymans* [see above, p. 61], to prevent further outbreaks after as much eradication as possible has been carried out. Directions are given for mixing paint and plaster containing zinc oxychloride [*R.A.M.*, 29, p. 594], the most efficient of the substances tested. The gauging solution contains fused zinc chloride, boric acid, and ammonium chloride (8–1–1 to 20 parts water). The paint consists of paint quality zinc oxide, talc, and whiting (2–4–6), to be gauged immediately before use by adding 12 parts (by weight) of paint to 9 of the solution. Paint quality zinc oxide, 25/50 and 52/100 mesh sand, and whiting (1–5–2–1) form the plaster, nine parts of which should be gauged immediately before use with two of the solution.

The surface treated with these materials should be dry and free from gypsum plaster, and the temperature should not fall below 45° F. following application. Two coats of the paint at 24-hour intervals or one thin coat of plaster are recommended. If the treated surface can be dried sufficiently then it may be decorated in the normal way with distemper or oil-paint.

STOECKLI (A.). **Die Abhängigkeit des Lignin-und Zelluloseabbaues vom Substrat bei Marasmius putillus (Fr. ex Fr.) Fr. und Marasmius foetidus (Sow. ex Fr.) Fr.**

[The dependence on the substratum of lignin and cellulose decomposition by *Marasmius putillus* (Fr. ex Fr.) Fr. and *Marasmius foetidus* (Sow. ex Fr.) Fr.]—*Schweiz. Z. Path. Bakt.*, 14, 5, pp. 567–572, 1951.

The author describes and tabulates the results of studies at the Institute of Agricultural Bacteriology, Zürich, on the ability of *Marasmius putillus* and *M. foetidus* to decompose lignin and cellulose [*R.A.M.*, 24, p. 472]. Both species attacked these two materials in air-dry leaves of *Acer pseudoplatanus*, birch, chestnut, oak, beech, larch, and *Abies alba* and sapwood chips of beech and spruce at 20° C.; the degree of decomposition depended on the material. *M. putillus* caused the greatest disorganization in beech leaves.

Jacks (H.). **Seed disinfection. VI. Surface disinfection of vegetable seeds.**—*N. Z. J. Sci. Tech.*, Sect. A, 34, 6, pp. 492–495, 1 fig., 1953.

In further studies on seed disinfection in New Zealand [cf. *R.A.M.*, 32, p. 328] the ability of seven fungicides, including panogen, spergon, and thiram, to eliminate fungi and bacteria present on vegetable seeds was compared with several commonly used laboratory methods of seed disinfection [31, p. 265].

Borders (H. I.). **Preliminary report on fungicide tests for control of downy mildew of Cabbage seedlings in South Georgia.**—*Plant Dis. Reptr*, 37, 6, pp. 363–364, 1953. [Multilithed.]

In a test carried out at the Georgia Coastal Plain Experiment Station, Tifton, in 1953 for the control of cabbage downy mildew (*Peronospora parasitica*) [*R.A.M.*, 31, p. 541; 32, p. 657] sprays were applied at 150 gals. per acre and dusts at 30 lb. to the Golden Acre variety. All the fungicides used, spergon spray (4 lb. per 100 gals.) and dust, kolophygon dust (30 per cent. sulphur plus 1 per cent. phygon), parzate dust, and dithane Z-78 spray (2 lb.) and dust, reduced infection from 70 per cent. on the untreated to from 7 to 26 per cent., none being greatly superior to the others.

Kerling (L[uise] C. P.). **Voetziekten bij Erwten, een gevolg van stuivende grond.** [Foot rots of Peas, a consequence of drifting soil.]—*Tijdschr. PlZiekt.*, 59, 2, pp. 62–71, 2 figs., 1 graph, 1953. [English summary.]

In experiments at the Phytopathological Laboratory, Wageningen, Holland, designed to simulate the field conditions contributing to the development of foot rot in young pea plants, sand, or water, or a mixture of both was propelled at a velocity of some 30 km. per hour on to the stem bases of ten-day-old Unica seedlings to produce the effects of sand storms, heavy rain, and the spattering of water containing soil particles. Each plant was exposed for ¾ minute to an air current directing the water or sand before inoculation with *Fusarium avenaceum* or *F. solani* [*R.A.M.*, 32, p. 163], followed by 24 hours in an incubator.

The slight water congestion induced by atomization with water alone soon disappeared, but the stems of plants impacted with water plus sand became translucent and the basal leaves turned dark green [26, p. 558]. The plants recovered in a few days, though the injured cortex was replaced by a grey layer of wound cork. The water congestion immediately following treatment, the thin, corky epicotyl, and the partial leaf necrosis observed a fortnight later were closely reminiscent of the field picture after a thunderstorm. Inoculation with the mycelia of the two *F.* spp. killed a high percentage of the plants wounded by sand, spore suspensions being less effective. No infection developed on the untreated plants or on those exposed to water alone.

The results of further experiments showed that wounding is not essential to infection, heavy watersoaking for a protracted period inducing a degree of susceptibility equal to that resultant on a brief exposure to rain after injury. Although the

admission of water to the intercellular spaces is facilitated by wounds, water congestion may also arise from the occlusion of the intercellular spaces by sap from injured cells. The infections developing after application to the stems of a dry mixture of sand and *F. avenaceum* spores are explicable in this manner.

It is concluded that young plants in the field may recover from sand storms and damage by uncontaminated sand unless heavy rain ensues, in which case infection may easily be produced by spores splashed up with soil particles.

GRAHAM (J. H.). **Overwintering of three bacterial pathogens of Soybean.**—*Phytopathology*, 43, 4, pp. 189–192, 1 graph, 1953.

Evidence was obtained at the North Carolina Agricultural Experiment Station that *Xanthomonas phaseoli* var. *sojensis*, *Pseudomonas glycinea*, and *P. tabacum*, the respective agents of bacterial pustule, bacterial blight, and wildfire of soy-beans [*R.A.M.*, 32, p. 166 and next abstracts], may be carried on the seed. Although the incidence of initial infection on seedlings from infected seed was less than 1 per cent., it sufficed to produce moderately severe symptoms under favourable weather conditions. Seed treatment with arasan failed to reduce the amount of primary infection. *P. tabacum* and *P. glycinea* were detected in seed six but not 18 months after harvesting, whereas *X. p.* var. *sojensis* was still alive at the end of $2\frac{1}{2}$ years. In a laboratory test in sterile soil, the three pathogens persisted for at least nine months, while in field soil *X. p.* var. *sojensis* and *P. glycinea* remained viable long enough to indicate that overwintering may be effected by this means. In field trials all three organisms survived the winter in diseased leaves on the soil surface, and *X. p.* var. *sojensis* and *P. tabacum* from this source attacked young soy-bean plants in the following spring. None of the bacteria was recoverable from soil or hay inoculated with broth and water suspensions.

GRAHAM (J. H.). **Cultural and epiphytotic relationships of three bacterial pathogens of Soybeans.**—*Phytopathology*, 43, 4, pp. 193–194, 1953.

Numerous instances are cited of the association of *Xanthomonas phaseoli* var. *sojensis* and *Pseudomonas tabacum* on soy-bean foliage at the North Carolina Agricultural Experiment Station [see preceding abstract]. Pustule lesions occurred on nearly all the leaves with wildfire symptoms and *X. p.* var. *sojensis* was isolated from most of the typical lesions induced by *P. tabacum*; in fact, the pustules of the former organism are the principal points of entry for the latter. In pure culture on broth media *P. tabacum* produces a diffusible substance, inseparable from the bacterial cells by the Seitz filter and filter paper disk methods, which is antagonistic to *X. p.* var. *sojensis* and *P. glycinea*, and neither of these organisms can be recovered when grown for 48 hours or more with *P. tabacum* in broth. A similar action on *X. p.* var. *sojensis* and *P. glycinea* was exerted by tobacco isolates of *P. tabacum*.

VAN DER VLIET (M.). **De bestrijding van de Aspergeroest.** [The control of Asparagus rust.]—*Meded. Dir. Tuinb.*, 16, 5, pp. 319–325, 1 fig., 1953. [English summary.]

Rust (*Puccinia asparagi*) is the most formidable disease of asparagus [*R.A.M.*, 32, p. 169] in the province of Limburg, Holland [C.M.I. map No. 216], where the crop covers approximately 1,000 ha. From the results of experiments carried out by the Plant Protection Service since 1949 it appears that the disease can be effectively combated by spraying with 0·35 per cent. zineb supplemented by a spreader, the first treatment being applied as soon as the uredospores are detected and thenceforth at 10- to 14-day intervals. Yield increases attributable to zineb in 1951 and 1952 amounted to 400 and 800 kg. per ha., respectively.

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